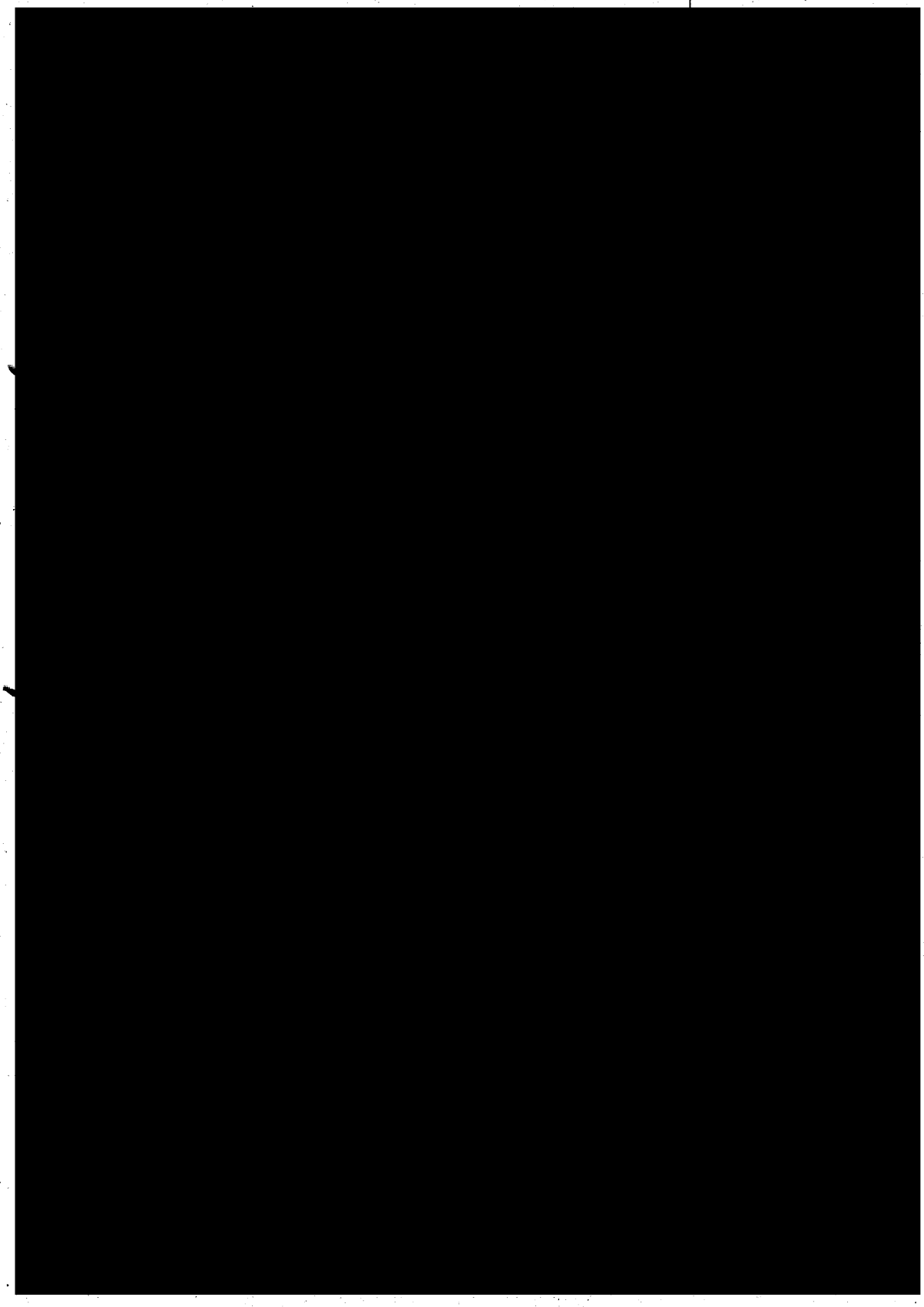


STATINTL

11 March 1965

MEMORANDUM FOR: Executive Director, NPIC

STATINTL SUBJECT : Overrun on Contract [redacted] for Variable Width Film Reader

REFERENCE : NPIC/D-8-65, same subject, dated 14 January 1965

1. The policy of trial and sentencing of the Plans and Development Staff without defense, implied by the referenced memorandum can result in serious delays to the NPIC development program if continued. Delays will accrue, (1) from more thorough contract administration in addition to regular technical inspection and (2) more thorough and formal documentation of monitoring activities, in order to form the protective bulwark necessary to defend the criticisms generated by such a policy.

2. It has been the policy of the Plans and Development Staff to present to the Technical Development Committee for approval only overruns requested by the contractor. Indications of overruns, prior to a formal request from the contractor, have been reported in Contract Inspection Reports for the use of the contract administration officers in the Office of Logistics when, in the judgment of the contract monitor, overruns seem to be in the making.

3. There has always been a clear-cut division between contract administration and technical monitorship of contracts. This principle is supported throughout the Office of Logistics' Procurement Handbook, HHB-49-3. This document does not cover overrun actions since no one is willing to

admit that such actions are predictable. In veiw of the spirit and content of the Procurement Handbook, it has been the opinion of the Plans and Development Staff that the contract monitor's function had been adequately performed when the contract administration officers had been informed of problem areas observed during technical inspections of the contract.

4. Contract overruns are not readily predictable without benefit of elaborate accounting and auditing procedures which are not within the skills of the usual technical monitor. Most frequently, predicted overruns represent no more than the intuition of the technical monitor derived from extensive experience and past observation of company performance. The intuition of a technical monitor is hardly a basis for recommending formal TDC actions.

5. The usual practice is to require a contractor as part of the contract, to report an impending overrun to the contract administrator (contracting officer) when the contract reaches the 75 percent expenditure level. The Office of Logistics, through the contracting officer, then undertakes to determine the cause and the amount of the overrun, and in consultation with the technical monitor concerned, make a decision on whether to continue, redirect, or terminate the contract. The advice of the technical monitor in such cases contributes heavily to the decision, but the decision and the formal action is the prerogative of the contracting officer. When the contractor does not meet his contractual obligation in reporting an overrun he can be held legally responsible for those expenditures beyond the 75 percent level even though the development is

brought to a successful conclusion.

6. The contract monitor for the subject contract has been asked to prepare a brief summary of events leading to the TDC action of 10 December 1964. From the information provided in the attached Memorandum for the Record, it becomes readily evident that the contract monitor and the Plans and Development Staff fulfilled their obligations under the policies and regulations then in effect. The real difficulty lies in two areas: (1) insufficient contract administrative action and (2) inadequate presentation of predicted overruns to the approval channel (TDC) by the Plans and Development Staff. The latter difficulty has recently been corrected, although little is being accomplished through the announcement of overruns to the TDC, other than to inform the Committee that approval action may be requested at some time in the future, if, and when, the company requests additional funds. The former difficulty is beyond the control of the Plans and Development Staff. The best that this staff can do is to continue to remind the contract administrative officers in the Office of Logistics that action on their part is delinquent.

STATINTL [redacted]

CONFIDENTIAL

NPIC/P&DS/D/6-713
11 January 1966

MEMORANDUM FOR: Assistant for Photographic Analysis

25X1A SUBJECT: [redacted] Variable Width Film Reader

25X1A 1. [redacted] Variable Width Film Reader was
25X1A recently checked out by [redacted] and P&DS personnel and has been accepted as a working prototype rear projection reader. In order for the Development Branch to improve on the design and further the state-of-the-art of rear projection readers, it is necessary that the present prototype be used and evaluated as a functional piece of equipment.

2. This equipment is a prototype and we realize that there may be undesirable features, inconveniences and maintenance problems associated with its operation. However, unless the prototype is treated as a piece of production equipment, basis for future designs and advancements will be hampered. Your constructive suggestions leading to improvements are needed and are welcome at any time.

25X1A 3. [redacted] of the Development Branch is available for discussion of any matters regarding the use of this machine.

25X1A [redacted]
Assistant for Plans and Development

Distribution:
Original and 1 - Addressee
1 - Project File/DB (#997053)
1 - Chrono/DB

25X1A NPIC/P&DS/DB [redacted] (7 Jan 66)

CONFIDENTIAL

STATINTL

STATINTL

STATINTL

DATE 26 August 1965

TO [redacted] **FROM** [redacted]

SUBJECT VWFR **COPIES**

STATINTL

STATINTL [redacted] contacted [redacted] on Wednesday, 25 August. At that time, Jerry had not made the adjustments previously recommended by Dave to correct the 165 film drive. He intended to make the adjustments and advise us of the results.

We discussed the tentative trip for maintenance, and because of Jerry's vacation, we agreed on 20 September. However, if Jerry is unable to correct the 165 problem, we may go back earlier.

STATINTL I will be forwarding to [redacted] on Monday, the technical write-up on the Xenon-Mercury lamp replacement for the 104 machine. He is awaiting this information to complete his request to their contracts division.

I hope you had a nice vacation.

BCJ/clt

STATINTL [redacted]

DATE 27 August 1965

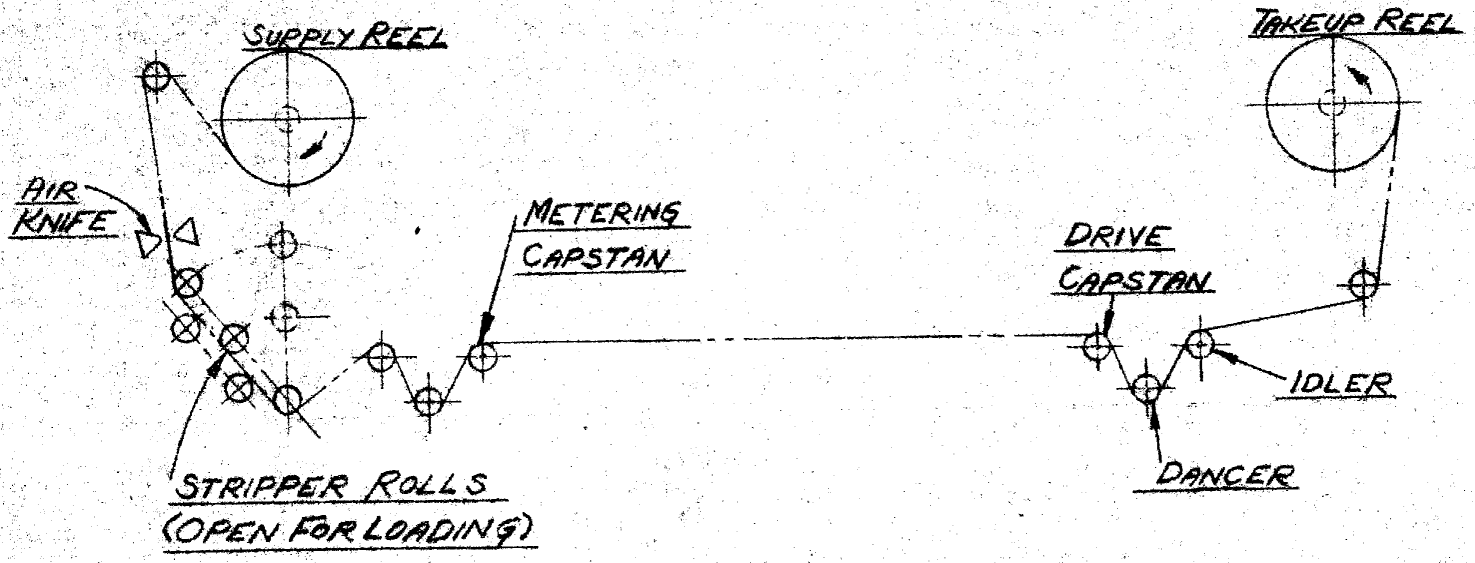
STATINTL

TO [redacted] FROM [redacted]

STATINTL

SUBJECT VWFR COPIES

STATINTL Would you please pass this on to [redacted] It is the film loading schematic for the VWFR.

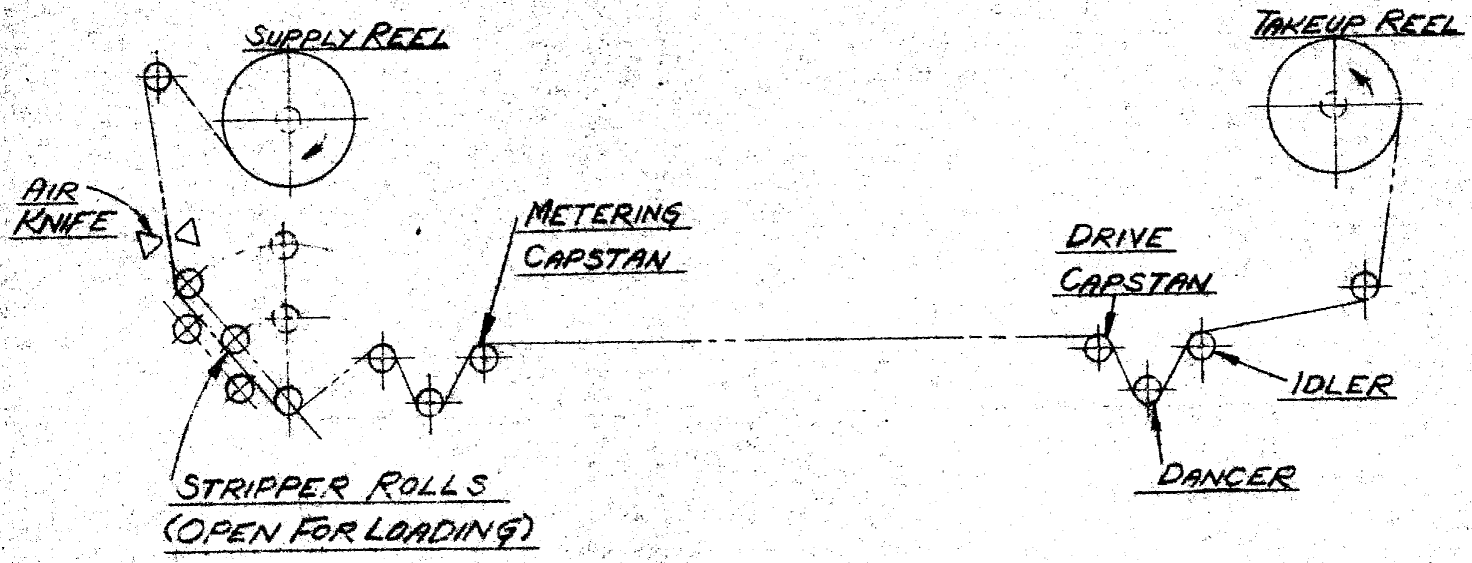


SCHEMATIC FOR
FILM LOADING V.W.F.R.
[redacted] 8/27/65

STATINTL

[redacted]

STATINTL



SCHEMATIC FOR
FILM LOADING V.W.F.R.
[redacted] 8/27/65

STATINTL

[redacted]

STATINTL

#3011

[redacted]

STATINTL

On the remainder of the 17th and 18th of September, progress on the V Variable Width Film Readers and Variscan Viewers was reviewed at [redacted] In addition [redacted] was given a complete review of the work [redacted] is doing in the stellar comparator field.

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The first six production Varyscans had just been dleivered prior to my visit, and none of the machines under construction were in operating condition, so I was unable to evaluate a working model. The major changes in the production model over the prototype were a completely redesigned cabinet of far greater rigidity, and substitution of a mechanical platen clamp instead of the vacuum platen. This platen differs from the [redacted] platens in that both glasses move instead of one and the total opening is 5/8", which allows complete freedom of the film during scanning and slewing. The platens are so adjusted that when closed, they cause a minimum of focus shift. In general, I was impressed with the production engineering results which make the Varyscan production model more functional then the prototype. Delivery of the NPIC Viewer is scheduled for the latter part of October.

STATINTL

As far the Film Reader, there were a number of minor deficiencies which require correction and two major problems areas.

There was considerable vibration of the image as projected on the screen, and the freon was not completely dried from the film when rewound at at high speed. In addition another major problem exists in providing an acceptable toxic vent. I have since been informed that they feel they have solved the vibration problem by reinforcing the cabinet. At present they are still working on solving the film drying and venting problems. It is possible that both of these problems could be solved simutaneously if we were willing to accept a higher freon loss.

No film resolution readings or light intensity values were taken due to the vibration and uncomplete optical alignment. The 48x lens presently STATINTL in the machine was considered unacceptable by [redacted] and an order has been placed for a new lens.

In general, the reader has the highest quality projection image viewed this far by the undersigned. Resolution appeared good as far as could be determined and their was an absolute minimum of color fringing apparent. The liquid gate appeared to function well and their was not apparent flutter of the image. The transport worked well, however, several of the minor correction requested were in the transport controls. The estimated completion date is presently the end of October unless additional problems are encountered in the venting aspect.

STATINTL Financially [redacted] has overrun the contract price. They have been requested to prepare a report to the contracting officer on the actual costs involved and the reason for not reporting at the 80% mark. This should be forthcoming shorthly.

STATINTL In addition [redacted] was given a complete briefing on the work [redacted]
STATINTL is doing in the stellar comparator and automatic image centering field. I did not sit in on these discussions so for [redacted] see
STATINTL [redacted] report in TID.

[redacted] Contract File

JR 28 Sept

24 September 1964

MEMORANDUM FOR THE RECORD

Subject: Freon 113, Chemical Breakdown of

1. In a recent discussion with [redacted] of the Department of Agriculture Research Laboratory, Beltsville, Maryland, I learned that the Freons as a group are not completely chemically inert and can break down into dangerous compounds. One of these is phosgene. [redacted] did not have any information as to the behavior of Freon 113 under uv radiation and suggested that I discuss this matter with [redacted] of Dupont.

2. In my discussion with [redacted] I found out that Freon can, under suitable conditions, break down to form perchloroisobutaline, which is fatal in concentration of less than 1 ppm. He did not have any information as to its behavior under uv radiation but suggested that we vent the system properly to prevent any possibility of causing illness or death to the operators.

3. [redacted] is forwarding all available information to me, and I will pass on any additional information that I receive.

4. Because of the possibility of a serious health hazard existing, it is suggested that the [redacted] film reader be held in San Francisco until it can be modified to allow a suitable air scavenging system to be attached. This should remove all the Freon before it can mix with room atmosphere.

[redacted]

Exploratory Development Laboratory Branch, P&EE

June 30, 1964

(3) File

STATINTL

VARIABLE WIDTH FILM READER

STATINTL [redacted] [redacted]

STATINTL

STATINTL

This company is making the condenser lenses for the [redacted] measuring projector. They have had some difficulty STATINTL and the condensers are now the pacing item on the [redacted] STATINTL instrument.

They have delivered all but one of the 13 elements required. First time around the element was undersize, too thin. Second time around they broke the blank. They are now working on the third time around. [redacted] has been STATINTL following up on them pretty heavily and they weren't too STATINTL happy to have somebody else come in.

STATINTL The company was founded by [redacted] about five STATINTL years ago. He formerly was production manager for [redacted] and decided to strike out on his own. [redacted] is President and there are STATINTL three other men with him who constitute management:

STATINTL [redacted] Vice President
Quality Control
Sales

Their principal activity is manufacture of optics for the aerospace industry. They are apparently pretty capable and competitive in their field. They have no product line of their own and do not do design of any complexity.

They have been in their present location about two years, and it is a modern well equipped plant. They have about 30 people in a 16,000 sq. ft. plant.

They have at least ten banks of quadruple arm polishing machines, three Blanchard grinders, a Blanchard edger, three vacuum coating jars, a curve generating grinder, and a machine shop with mills, lathes, drill presses, etc. They have separate air-conditioned test facilities with flats, beam splitters, collimators, etc. They have no automatic high-speed production equipment.

I think their problem is a transient one and it is common and peculiar to optics shops. For the past 9 months they have suffered from the local slump in aerospace. Business has recently picked up and they are trying to expand a bit.

The optical grinding and polishing labor market is small and very specialized. An optical shop can't afford to keep its full force on during slack periods, and then during full periods it has trouble getting the good people back. While generally the same is true in any business, it seems to be more acute in optics shops.

STATINTL I suspect they had some people on the routine part of the [redacted] condensers who were a little less experienced than they were thought to be.

STATINTL [redacted]

[redacted] Variable Width Film Reader

STATINTL

TELEPHONE OR VERBAL CONVERSATION RECORD

Subject of Conversation	Date
Variable Width Film Reader	13 Jan 64

Person Calling	Office or Company	Telephone Number
[redacted]		

Information or Action Sought

Image Inversion Problem still undetermined

STATINTL

Information Given or Action Taken

To let me know how they intend handling it.

Date	Time	Signature
13 Jan 64	1800	[redacted]

STATINTL

TELEPHONE OR VERBAL CONVERSATION RECORD

Subject of Conversation	Date
STATINTL Variable Width Film Reader	8 June 64

Person Calling	Office or Company	Telephone Number
[redacted]		

Information or Action Sought

Information Given ~~or Action Taken~~

A blank has been obtained and the glass vendor estimates he will have the lenses completed by 22 June 64.

STATINTL [redacted] is studying the production costs of the grades and feel it will take an additional two weeks to come up with a valid figure

Date	Time	Signature

DX Priority

TELEPHONE OR VERBAL CONVERSATION RECORD

Subject of Conversation	Date
Variable Width Film Reader	1 June 64

STATINTL

Person Calling	Office or Company	Telephone Number
[redacted]		

Information or Action Sought

(1) Called to get status of delivery of Reader

(2) When to get maintaince personnel there

(3) Who is on way to do DSMP maintaince

STATINTL

Information Given or Action Taken

(3) [redacted]

(1) 2 lenses not acceptable - min of 6 weeks on delivery (aspherics) (Crown glass blanks - delivery 3-6 week - 1 week fabrication starting last week -

3 must be corrected or changed - 4, 10, + 11

4 + 10 aspherics -

11 to be reworked

10 have blanks - less than 4 weeks

4 - no estimate as to delivery - dependent upon blank delivery

(2) Expected to start debugging by 15 June

Date	Time	Signature

27 May 1964

STATINTL [redacted] Variable Width Film Reader File

The condenser system subcontract was with:

STATINTL [redacted]

The applications called for 1% tolerance. Five (5) of the elements varied with anywhere from 2% to 8% error.

STATINTL [redacted]
Development Branch, P&DS

STATINTL [redacted] (Separate Copy)
STATINTL [redacted] 04747A001200020004-3
STATINTL (1) Pat. File [redacted]

May 5, 1964

STATINTL Variable Width Film Reader Contract [redacted]

STATINTL [redacted]

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Since I was going to visit [redacted] suggested I come up a day early and also visit [redacted] This was good timing because [redacted] had just finished a general purpose rear projection viewer and it was on display at their place.

This new viewer was a crash program with them. They had designed and built it in less than 4 weeks in respnse to a SAC requirement. The viewer was excellently conceived and generally well executed. [redacted] indicated there were some details they were not satisfied with and would be improved. The cable routing was obviously incomplete and they said the adjustment of the condenser optics was not right. With an open gate we could observe some color fringing at the high magnifications. This was one of the best general purpose viewers I have seen.

The variable width film viewer was on the assembly floor partially assembled. It was not being worked on and I suspect the new viewer crash program had soaked up all their manpower. [redacted] said they were waiting for delivery of condenser lenses which had to be installed and adjusted before they could proceed. It appeared as though all the major mechanical parts were on hand.

The power supply for the 5 KW light source is in a separate cabinet. It was line noise from this power supply which was giving them trouble with the Computer Measurements counter. This has been corrected now, although they did not go into details.

Probably the only draw back of any significance to the [redacted] machines is that there must be access to the rear of the machines for loading film rolls. My personal opinion is that the reduction in the number of mirrors which this makes possible, more than offsets this drawback.

[redacted]

[redacted]

JWFR

[redacted]

April 1, 1964

Dear John:

Subject: Azimuth Indication - Job 165

The Job 165 rotation system is designed for operator convenience only. Its rotational speed is about 9° per second. If the operator has a physical reflex time of perhaps 1/3 second, the setting accuracy will be on the order of 2 or 3 degrees. In order for an indication of 0.1° to be meaningful, the tray would have to be capable of being set to the same accuracy. To obtain that accuracy, a different motor and control circuitry would be needed. At least 50 hours of engineering plus probably

[redacted] in parts would be required. Indication of the angular position should be taken from the granite doughnut. Several approaches have been discussed:

a. A flexible shaft to a Veeder Root counter on the console.

b. A flexible shaft to clock type readout.

c. Encoder geared to ring gear with up and down counters displayed on the panel.

d. A shaft position encoder with 3600 increments for directly wiring to Nixie readout on the console.

e. Putting an azimuth ring on the joystick as planned. This will provide the lowest cost solution but is accurate only to about 1 or 2 degrees.

f. Scale marks directly on the granite with an optical readout.

g. Substitution of synchros for the mechanical couplings suggested above.

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The cost of materials for this requirement would run from a minimum of [redacted] for the least accurate (e) up to [redacted] for the more accurate (c or d). We would not want to recommend a system unless we were a little clearer in our own minds as to what the end use would be, since there may be ways of achieving the same end for considerably less money. Certainly, if it is to be incorporated into the existing machine, we should take steps to do it immediately.

Very truly yours,

STATINTL

[redacted]

Director of Operations

WHM:jb

TELEPHONE OR VERBAL CONVERSATION RECORD

Subject of Conversation	Date
Variable Width Film Reader	31 March 64

Person Calling	Office or Company	Telephone Number
STATINTL [redacted]		

Information or Action Sought: DSMP Surplus list has not been received
99% complete

Information Given or Action Taken

Water the same as originally stated

Power supply 2'X2'X4' to be placed outside machine due to shielding problems

Letter to be sent confirming latest pc air conditioning requirements

Date	Time	Signature
31 March	1500	STATINTL [redacted]

SECRET

[redacted]

25X1A

[redacted]

25X1A

REGISTERED

25X1A

[redacted]

25X1A

SUBJECT : Contract [redacted]

Gentlemen:

Reference is made to recent request and discussion concerning approval to release certain information concerning the use of liquid freon for cooling a film viewer developed under subject contract.

This will serve as Contracting Officer's authorization to release the information as outlined above, with the understanding that no mention of this sponsor is to be made.

Your cooperation in this matter is appreciated.

Very truly yours,

25X1A

[redacted]

Contracting Officer

SIGNED

BY

Duly Authorized Representative

SECRET

GROUP 1
Excluded from automatic downgrading and declassification

STATINTL

TRANSMITTAL SLIP DATE 6 Apr 64

[redacted]

ROOM NO. 2W411

REMARKS:

File
VWFR

STATINTL

FROM: L. B. Imle

[redacted]

ROOM NO. 6N222 EXTENSION 3623

FORM NO. 241 1 FEB 55 REPLACES FORM ... WHICH MAY BE USED. O-439445 (47)

18 March 64
VWFR

17 March 1964

25X1A MEMORANDUM FOR THE RECORD

SUBJECT: Trip Report to [redacted]

25X1A

25X1A 1. On the 6th of March, the undersigned accompanied by [redacted] visited [redacted] to review the progress on the
25X1A Variable Width Film Reader. In addition, we sat in on a presentation given to SAC personnel on a new film viewer which [redacted] is developing as an in-house project.

25X1A 2. Due to the recent discrepancy in security certifications, the
25X1A security problems were discussed with [redacted] It is the opinion of both parties that [redacted] now has sufficient security clearances either approved or in processing.

25X1A 3. [redacted] optical consultant, was on board for most of the day and I had the opportunity to discuss the VWFR optical system which he designed and also briefly discuss the results obtained on the DSMP for which he also did much of the optical design. Some of the more important considerations discussed were:

a. Advantages of the Old Delft versus Polocoat screens.

25X1A b. [redacted] requested data on screen intensities achieved
25X1A on the DSMP to aid him in his analysis of the design. [redacted] had some data available and I will take additional foot candle readings when time permits.

25X1A c. [redacted] stated that full lamp intensity must not reach the projection lenses on the VWFR for any extended period of time (open gate, full lamp intensity). Normal precautions are being taken to guard against this.

d. The only filter planned for the optical system is the 8"x8" Diachroic mirror. This will have a 3μ or 4μ cutoff.

e. Corrector elements have been designed and ordered for the 24X and 48X lenses. The function of these elements is basicly that of a field flatner and they will be attached to the front of the lens barrel.

25X1A f. The [redacted] data on the eliptical reflector had
25X1A not been given to [redacted] so I asked him to fill out a Form 1841 for clearance so that we may discuss this data directly and use his services again if required.

25X1A

4. The readout electronic counter problems indicated in the last [redacted] report were discussed with [redacted] Apparently there are no serious problems involved and it is purely a matter of proper communications. They have successfully operated the counters and feel it is a matter of properly connecting them. This has since been clarified. The problem was due to a shipping error.

25X1A

5. The control panel was reviewed by [redacted] and several small changes were made in the physical location of some of the controls. I requested that the transport mode switch be deleted from the panel and the functions interlocked directly with the controls. I also requested that they not delete the speed range selection controlled by magnification selection as they indicated in their last report.

25X1A

6. Non-[redacted] personnel present at the Film Viewer presentation were [redacted] The basic specifications for the viewer are:

25X1A

a. $9\frac{1}{2}$"x$9\frac{1}{2}$" maximum aperture at 3X, with 6X, 12X and 30X projection on a 30"x30" screen.

b. Overall dimension of 87" long, $34\frac{1}{2}$" wide, 68" high with an estimated weight of 2400 pounds.

c. Light source - a 1500 watt tungsten lamp with screen brightness spread of $\pm$ 10%. No figure was given as to the nominal brightness achieved.

d. The projection optics and transport are to be a removable subassembly for ease of maintenance.

7. Delivery of the 1st unit would be four months from receipt of order with additional units of approximately two a week thereafter. Much of this production schedule is based on producing most of the units at the [redacted] A breadboard printed circuit motor transport was displayed for those present. The smoothness and handling qualities appeared far superior to anything we now have in-house. The design of the viewer is an in-house effort utilizing the experience and knowledge gained on the VWFR, MPS and similar measuring projectors with critical transport and optical problems.

25X1A

25X1A

[redacted]
Development Branch, P&DS

File
VWF Reader

[redacted]

[redacted]

March 13, 1964

Dear John:

At your request, we are going to reincorporate speed range selection with the magnification selection.

Joystick placement will have to be on the right of the hand-wheels, because of physical restrictions of synchro transmitters inside the console. Console dimensions are being minimized. To this end, the synchro transmitters are being mounted perpendicular to the panel.

We are considering the implications of separating different items from the machine for placement elsewhere to eliminate heat, vibration and maintenance problems.

Otherwise, nothing much to report since the last letter and your visit March 6, except that the hardware is continuing to take shape in satisfactory fashion.

Very truly yours,

[redacted]

Director of Operations

WHM:jb
cc: Contracting Officer

[redacted] Reader File

[redacted]

March 12 1964

JOB #165 Removal of Components From Frame to Outside Location

1. A.) Cooling of present heat exchanger cannot be accomplished by moving it outside with ambient temperatures above 70° F. using Freon. -- With Ambient temperature at 100° F. Freon will boil and no heat exchanger can be used.

   B.) (1). A possible solution would be to circulate water through lamp housing instead of Freon. This is 5 times as efficient but requires 2 smaller pumps and 2 separate liquid circuits.

   (2). Tap water could be used which would eliminate one pump. No problem with algae since water doesn't pass through light path.

2. Tank. No problem moving out, but must provide a min. of 2-1/2 - 3 ft. drop in level for gravity drain.

3. Compressor. No problem. Find out distance from compressor to outside location.

4. Reduction of BTU's in Room

5 KW for light	4 KW Removed, out.
1 KW Pump and Compressor	1 KW Removed, out.
1 KW Electronics	
.5 KW Ushio Power Supply	
7.5 KW Total	

   Leaves 2.5 KW in Room Instead of Estimated 7.

   7 KW = 56.8 x 7 x 60 = 25,000 BTU/Hr. approx.
   2 KW - 56.8 x 2 x 60 = 6,816 BTU/Hr. approx. left

5. Power supply (Ushio). How far away from unit is new location? 10 ft. would be permissible. -- Involves wiring, conduits or such, 2 heavy leads to lamp, 6-8 leads for controls.
   Reasons for moving:
   A). Heat 500 W.
   B). Fan Vibration
   C). Possible Electrical noise.

6. Humidity, barometric pressure changes won't affect performance of either pump(s) or power supply. -- main concern is ambient temp. when above 70°F.

   Room temp. of machine should still remain as specified.

ILLEGIB

Approved For Release 2001/08/07 : CIA-RDP78B04747A001200020004-3

TELEPHONE OR VERBAL CONVERSATION RECORD

Subject of Conversation		Date
VWFR		11 March 64
Person Calling	Office or Company	Telephone Number
STATINTL [redacted]		

Information or Action Sought

STATINTL Condenser unit can be installed on [redacted] ~~and~~ as well as compressor & pump if it is practical ~~other units~~ STATINTL from [redacted] viewpoint. ~~If this~~ is done there will be about a 12 foot head required for the pump. In addition if any part of the system is placed outside the room a breakdown of the BTU requirements is STATINTL required. I suggested that [redacted] come here to discuss the problem with maintainence ~~of them~~ move the system out.

Information Given or Action Taken

The possibilites outlined above will be discussed with the engineering staff and a reply will be given as soon as possible

Date	Time	Sig
STATINTL 11 March 64	[redacted]	[redacted]

[redacted]

VFWR

STATINTL

February 17, 1964

Dear John:

Subject: Questions Regarding DSMP and VWFR

1. DSMP - Mercury Vapor Lamp

We have discussed with the manufacturer of the lamp the necessary precautions in handling, storing and disposal. In all respects, they recommend treating this lamp exactly as you would an ordinary fluorescent tube. I would add that when a lamp is being discarded, it should be wrapped in cloth, placed in a trash can and broken.

There is not enough mercury in this lamp to create any toxic effects if it explodes. This is the worst condition.

In handling the lamp while it is still in operable condition, avoid contacting the glass with your skin so that no perspiration or skin oils will be deposited on the glass.

The lamp should be stored as you store any other glass vessel which is fragile and pressurized. Several layers of cardboard surrounding it, the whole in turn being placed in a fairly strong container, is sufficient.

2. DSMP - Lamp Housing

Our disassembly of the lamp housing indicates that the deposits you observed are primarily inorganic salts resulting from electro-chemical action. To avoid this in the future, we have plated the entire assembly with a kanigen nickle plate which should provide protection against this type of action in the future. It might be a wise idea to check the pH of your water supply and to treat the water to be slightly alkaline or neutral if this is possible. The heat glasses have been replaced and new gaskets have been incorporated in the system. The housing was pressure checked with water at 10 psi, a small leak was found, and sealed. Another test at the same pressure showed no leakage. The housing was shipped with

the lamp in place and held by extra rubber padding inside the housing. This padding must, of course, be removed before operation, and the lamp carefully centered in the window of the housing.

3. DSMP - Beam Splitter vs. Prism

The choice of a beam splitter for projection of the image onto the small screen was made because a prism large enough to do the job would have been too costly.

4. VWFR - Reticle Stability

We feel that there is little difference between the stability of a projected reticle and one which is etched on the screen. However, the obvious comments are that the projected reticle can be designed into the system in such a way that any temperature or optical effects operate equally on it as on the projected image from the film. This would, of course, not be true with a reticle etched on the screen. Motion of the screen with respect to the film is more likely than motion of a reticle projector with respect to the film because of the distances separating the screen and film as compared to the distances separating the reticle projector and film.

However, in the case of the VWFR, it is not possible to mount a reticle projector close to the main projection system without a great deal of complexity. Since any unwanted thermal movement of the reticle with respect to the projected image will be slow when compared to the time needed for a given set of measurements, we feel a reticle embedded in the screen will prove satisfactory.

5. VWFR - Lamp Housing

The machine section sent to you on February 13, 1964, shows the lamp housing located on a bracket at the rear of the machine. The housing is made removable so as to comply with the overall machine length limits. Its location was dictated by the optical path length required.

Very truly yours,

STATINTL [redacted]

Director of Operations

WHM:jb

[redacted]

STATINTL

February 14, 1964

Dear John:

We enclose the slides you requested of the sectional drawing of the variable width film reader. I hope they are satisfactory.

If you wish further slides made of other portions of the equipment, we will be most happy to help.

Very truly yours,

[redacted]

STATINTL

Director of Operations

WHM:jb

Enclosures

STATINTL

[redacted]

February 13, 1964

Dear John:

Enclosed are two copies of Drawing F-188, Variable Width Film Reader Assembly.

Slides of each view will be completed Friday, February 14, 1964.

Very truly yours,

STATINTL

[redacted]

Director of Operations

WHM:jb

Enclosures (2)

[redacted]

STATINTL

February 4, 1964

Dear John:

This is to confirm receipt of two bidirectional counters, one synchronizer unit, one front panel, and miscellaneous cables.

They are functioning satisfactorily and are now incorporated in the experimental system.

Very truly yours,

[redacted]

STATINTL

Director of Operations

WHM:jb

[redacted]
Variable Film
Ruder
[redacted]

29 January 1964

STATINTL [redacted]

Dear Bill:

I have discussed the control panel design with several individuals and would like to make the following recommendations:

1. Decrease the depth as much as possible without crowding it either mechanically underneath or operationally on top. I have no objection to increasing the width up to the width of the machine (46") if necessary.

2. If the operator can reach the panels beside the screen without leaning forward enough that he must leave the chair, I would like the following controls placed on the side panels: (1) Brightness, left side, (2) Focus, right side, (3) Magnification selector, left side.

3. If you feel it practical to put the above controls beside the screen, the film slew control could be moved to the left side with the rotation control and the joystick and measure slew controls could be moved up.

4. I discussed the possible addition of a clip similar to those used on clip boards with Dave during my last visit. I would appreciate it if you could look into the possibility of installing this on the extreme right side so that the operator could have somewhere to place reference material or a writing pad, if he so desired.

I would appreciate your comments on the above suggestions as soon as you have had time to consider them.

STATINTL [redacted]

SECRET

Variable Width Film [redacted]

25X1A

27 January 1964

MEMORANDUM FOR: Assistant for Plans and Development

25X1A

SUBJECT: Trip Report [redacted] 10 January 1964

25X1A

1. [redacted] was visited on the 10th by [redacted] to review the progress of the Variable Width Film Reader.

25X1A

25X1A

2. The project, in general, is going satisfactorily, but a good feel for the performance cannot be achieved until they start testing. The optical design by [redacted] is now complete. The condenser system utilizes thirteen different elements for the four different magnifications (all not in use at one time) and may be over-sophisticated. Drawing and specifications were brought back and have been hand-carried to [redacted] for comment. At least two of the condenser systems are aspheric and [redacted] requested information on possible vendors, since this is now the critical path in determining delivery. The name of [redacted] was forwarded to them as a possible source. It was suggested that substitute condensors be considered for the check out phases to expedite delivery if it did not materially increase costs. The [redacted]

25X1A

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25X1A

25X1A

25X1A

3. They estimate they can achieve approximately 870 foot-lamberts open gate at 48X utilizing a Xenon 5000 watt source. A sufficiently large Freon tank has been incorporated to insure a minimum of two weeks before refilling under normal operating conditions. It will be used to cool both the film and lamp housing.

4. At present, they estimate delivery by early April if no unexpected problems are encountered in check out. An installation engineering form was given to [redacted] to fill out and return as soon as possible, and a cross section drawing of the machine was requested to show the relative position of the various sub-assemblies.

25X1A

5. Due to the large size of the liquid gate and associated transport equipment, it was necessary to increase the overall width to 46 inches. This is wider than desired, but will allow for decreasing the complexity of the control panel by putting some of the controls beside the screen.

6. A potential problem area may exist in the Y or traverse motion but sufficient room exists on the base to put an additional guide on if required. Another area to be closely watched is the vibration dampening from the freon chiller and pump. It may be necessary to separately mount these elements.

25X1A

[redacted]
Development Branch, [redacted]S

SECRET

[redacted]

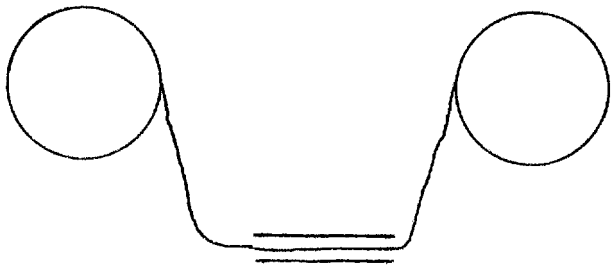
STATINTL

January 20, 1964

Dear John:

Confirming our letter of 11 September 1963, viewing will be through the base, with emulsion down.

Film will wind as in the sketch below.



Very truly yours,

[redacted]

STATINTL

Director of Operations

WHM:jb

Item	Delivery Date
Ball Screw	12-23-63
Granite Doughnut	12-20-63
Main Castings	12-16-63
Air Bearings	12-16-63
Circ. Ball Bearing	12-18-63 (Shipping date from Mich.)

Approved For Release 2001/08/07 : CIA-RDP78B04747A001200020004-3

STATINTL

Appr [redacted]

November 11, 1963

STATINTL

Dear [redacted]

We have looked at the Micro Nikkon lens as you suggested, but find it unsuitable as a projection lens.

STATINTL
STATINTL

The supplier [redacted] states that the resolution drops to 16 lines/mm when used as a 30:1 projection lens.

The field required at 24X is 1.2 inches square. The lens in question, when stopped down to f3., covers only 20 mm square (.78 inches square).

Resolutions mentioned are for monochromatic light. The Variable Width Film Reader using a Xenon short arc will produce a continuous spectrum.

Thank you for the suggestion.

Very truly yours,

STATINTL

[redacted]

DBA:jb

STATINTL

[redacted]

Projection System

STATINTL Specifications due from [redacted] 18 December 1963.

Lenses to be purchased:

STATINTL [redacted]

Delivery of above, 1 January 1964

Condenser System

STATINTL Specifications due from [redacted] 23 December 1963

Cost of cond. lenses approx

STATINTL [redacted]

Earliest est. delivery, 15 February 1964

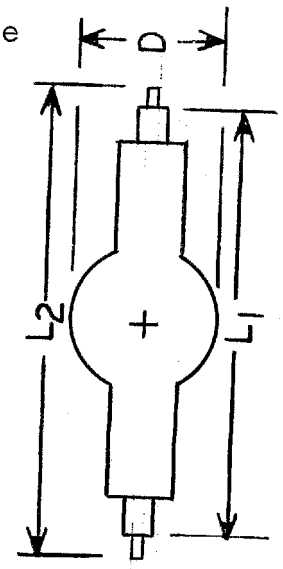
STATINTL

Approved [redacted]

16 October 1963

Dear John,

1. We have decided to use the Ushio 5KW Xenon Lamp, Model UXL 5,000 DK. Some parameters of this, the G.E., Hanovia, and Plasmadyne 5 KW lamps are tabulated below. The small bulb dimension of the Ushio was the major deciding factor between Ushio and G.E. Plasmadyne was rejected because of the volume of auxillary equipment, and projected maintenance problem.



	D	L_1	L_2	$	Del.-
Ushio	2 3/8"	15"	16 3/4	[redacted]	30
G.E.	3 1/2"	16 13/16"	19 1/2		30
Hanovia	3 1/2"				90
Plasmadyne	1 1/2"		12"		90

STATINTL

2. We have also decided to turn the tray and not use Pechan prisms for image rotation. This will give us the best possible picture quality. There will not be the light loss with prism, or possible runout of image, nor any chance of image degradation due to thermal creep in the prism.

STATINTL

Very truly yours,

[redacted]

Senior Engineer

DAW:plf

STATINTL cc: [redacted]

TELEPHONE OR VERBAL CONVERSATION RECORD

Subject of Conversation		Date
Film Reader & Stellar Comparator		10 Oct
Person Calling	Office or Company	Telephone Number
STATINTL [redacted]		

Information or Action Sought

STATINTL Clarification of [redacted] interface and delivery of stellar comparator proposal.

Information Given or Action Taken

STATINTL [redacted] to contact STATINTL [redacted] and also to buy amplifiers & multipliers

Continuing to look into prism problems because of the plumbing problems

Plasma light source 7500 watts at ? PSI
argon + Xenon

Plasmadyne

Date	Time	Signature
10 Oct 63		STATINTL [redacted]

STATINTL

11 September 1963

Dear John:

STATINTL

Confirming the telephone conversation with [redacted] this week, we will build the final machine with the emulsion side of the film down. We are proceeding on the experiment with the emulsion side up.

Sincerely,

STATINTL

[redacted]

DAW:lhf

Senior Electronic Engineer

STATINTL

cc: [redacted]

[redacted]

5 Spetember 1963

MEMORANDUM FOR THE RECORD

SUBJECT: Trip Report Covering 19 Through 27 August 1963

25X1A

25X1A

1. A visit was made to our [redacted] Contract Station on 19 August to discuss contractual actions with [redacted] The contract for 20 viewers was finally signed with two exceptions from the agreement reached during my last visit. On the production of the first eight units under the contract, the machines will be built with the same drive unit as the 705M units now in-house. A price reduction was agreed upon due to the change of specifications. In addition, the first eight units are to be delivered on a redeterminal downward basis instead of straight fixed price. No changes were made in the penalty clause for the first eight units. The terms of the additional 12 viewers and 2 Navy readers remained unchanged.

25X1A

25X1A

2. On 20 August [redacted] to review development of the new reader. Development of the reader thus far has proceeded on or ahead of schedule (for more complete details of progress refer to the [redacted] 9 August monthly report and PERT chart). The present plan calls for a demonstration and testing of the liquid gate on or about 16 September. If no unexpected difficulties arise in the breadboard liquid gate there is a definite possibility of an early delivery. For the prototype viewer however, it will be necessary to use a conventional condenser light source since considerable work is still required on the [redacted] design. To aid in the design for the condenser system [redacted] plans to utilize the consulting services of [redacted] who has considerable experience in this field. Additional information is required by [redacted] on maximum acceptable dimensions of the machine and specifications or samples of various sizes of film spools to be used. This information will be collected and sent as soon as possible. In addition, they inquired if we had a firm requirement to view large quantities of 35mm film on the viewer. Since no 35mm systems requiring the capability of this machine are known it was decided to release them of the requirement for measuring on 35mm film. This will allow the 35mm position allocated on the vacuum caption to be used for one of the other proposed film widths and will not preclude the use of the instrument for viewing only 35mm film. They informed me that they plan to use a [redacted] Shaft Encoder on X giving 4096 counts per revolution and a [redacted] Shaft Encodes on Y giving 127 counts per revolution. The [redacted] will require a 4X preamp and the [redacted] a 2X preamp to give the required film movement resolution. Action has been taken to include these preamps in the [redacted] contract for the readout electronics.

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25X1A Of concern to the [redacted] technicians who installed the Dual Screen Measuring Projector was our ability to keep the instrument in top operating condition. 25X1A They stated that [redacted] averaged less than 15 minutes a day working with them during their last visit in August and showed little incentive to learn about the electronics. A copy of their inter-plant communications concerning the DSMP has been placed in the job file.

3. On the 21st and the morning of the 22nd of August the WESCON Conference was attended. This was one of the largest trade shows ever staged 25X1A and the literature obtained will be disseminated through the staff as appropriate. Of interest was the large number of lasers on display.

25X1A 4. On the afternoon of the 22nd, [redacted] and I visited the [redacted]
25X1A [redacted] to review their chip storage capability. This is the same group
25X1A of people who worked with [redacted] on the Minicard System and have visited us here several times to discuss their Magnacard System. They now have on the market a 16mm by 32mm system that accomplishes most of the functions of Minicard, plus having additional characteristics of its own at a small fraction of the Minicard cost. Of particular interest was the fact that they are reading the chip BCD code with a light modulated bank of photocells instead of the CRT raster technique. The advantage of this system is simplicity and relatively low cost.

25X1A 5. [redacted] and I also visited [redacted] on the
25X1A 22nd to see the HTA/5 prior to shipment but they were not able to operate it during our brief visit.

25X1A 6. On the morning of the 23rd I visited [redacted]
25X1A to review the progress for the readout devices for the [redacted] reader and the
25X1A [redacted] Chip Comparator. Work is progressing on schedule and they plan to meet their 14 October delivery schedule. However, they had made no
25X1A provision for the preamps required by the [redacted] machine as previously described. They will look into this and report to me shortly on how they can best incorporate them in the equipment. As it now stands, each unit will consist of
25X1A 3 rack drawers. A four foot cable will be provided between the control panel
25X1A and the rack drawers for the [redacted] and a 6 foot cable for the [redacted]

25X1A 7. The [redacted] was visited on the afternoon of the 23rd. The Linear Phasolver is progressing according to schedule and a demonstration of the feasibility breadboard can be arranged anytime after the 16th of September. A complete monthly progress report for the first month's work is on file. In addition, they are looking into the possibility of connecting their telecordex to the Teletype Model 35 in response to a TID requirement for a Flexowriter replacement.

25X1A 8. On the 27th and 28th of August [redacted] new
25X1A facility in [redacted] was visited. The new plant is about twice the size of their old facility and well laid out. Additional equipment

available at the new facility consists of a new milling machine, a larger capacity lathe and a variety of glass polishing equipment. Their manpower has been raised back up to the level it was about eight months ago when they
25X1A decided to move to [redacted] and subsequently left it drop. At present they
25X1A plan to hire additional personnel to increase the labor force. Of importance is the addition of an electronics engineer [redacted] and an optical man,
25X1A [redacted] to their staff. They eventually plan to set [redacted] up in a
25X1A separate plant and establish an optical capability.

25X1A [redacted] spent the entire time I was there operating the mirror polishing machine and I was given no formal opportunity to discuss the viewer development with him. However, in an informal coffee break, discussion, he
25X1A expressed the opinion that the optical design used in the [redacted] series was at best a compromise design and could never give the optimum results we desire. In his opinion a separate condenser system is required for each magnification. As yet however, he has not been given the opportunity to work on the reader or viewer design and apparently has spent most of his time with the company polishing mirrors. He has however, determined the major cause of the color fringing of the viewers in-house and has eliminated a large part of it by repositioning the two upper (smaller) condensers. This is a modification that should be eventually made to our 705M viewers.

Virtually no progress was made on the electronic readout for the readers since my last visit. However, they were able to operate the reader transport and it offers promise of being considerably superior to the 705M transport.

They are now in the process of completing 4 viewers, 3 of which are
25X1A still to be delivered under Contract [redacted] and one as a replacement for the
25X1A [redacted] prototype we loaned them for the reader development. They plan to have these units ready for inspection by mid-September if they can get delivery of the control panel switches. In addition, they have the first four cabinets in-house for the eight rush viewers under the new contract. They plan on having these ready for shipment in early October. As of my visit they had not assigned anyone to begin work on the 12 additional units under the new contract.

While there I noticed they were using 20 guage wire on the electronic sub-assembly to connect the external power line with the lamp and other electrical components. That is they were running the entire current used (15 amp fused) through 20 guage wire. This may cause voltage drop to the lamp and other components thereby reducing efficiency. All machines deliv-
25X1A ered under Contract [redacted] should be checked to see if adequate wiring has been used.

25X1A
25X1A While at [redacted] a representative of [redacted] visited to discuss possi-
ble modification of the Air Force viewers. He was not aware of the design
25X1A difference between the [redacted] and was planning on one modification kit for both machines. Most of the proposed changes which the Air Force

requires however, are more in the field of human engineering rather than performance and may not be of interest to NPIC. The items of direct interest to us however are (1) better lamp cooling (he brought a sample of a bulb fused to the diachroic filter), (2) venting the motor housing to let the heat escape, and (3) improved film handling characteristics of the transport. We plan to get together in Washington to further discuss these changes.

25X1A

In summary of [redacted] the overall performance level should improve. However, two major problems may continue to exist. These are: (1) the need for higher caliber technical personnel with the freedom to design equipment to the best of their ability. (2) Convincing

25X1A

[redacted] that when he accepts a contract with a firm delivery date that he is obligated to make every attempt to meet it within normal contractual practices and not slip small extra jobs in which delay delivery. Both of the above deficiencies have been apparent during my frequent visits. I feel that both of these points can be cleared up by more rigid specifications written by NPIC and firm contractual delivery commitments, involving penalty clauses if necessary.

25X1A

[redacted]
Development Branch, P&DS

TELEPHONE OR VERBAL CONVERSATION RECORD

Subject of Conversation	Date
Reader	9 Sept

Person Calling	Office or Company	Telephone Number
STATINTL [redacted]		

Information or Action Sought

Reply to STATINTL [redacted] questions

Information Given or Action Taken

STATINTL [redacted] reply - 127 count associated by 10 micron least count. No ball screw of the proper micron pitch could be obtained.

Image inversion was realized but they thought that we did not object since it is that way on the DSMP

Date	Time	Signature

TELEPHONE OR VERBAL CONVERSATION RECORD

Subject of Conversation	Date
Reader	9 Sept 63

Person Calling	Office or Company	Telephone Number
STATINTL [redacted]		

Information or Action Sought

Info on Freon
Millipore Filter Corp given as a possible filter source
Inverted Image - to be reported on during next visit.

Information Given or ~~Action~~ Taken

30 drawings on liquid gate - last drawings to be released today
Liquid gate now due on 23rd - now firms
STATINTL [redacted] lined up but no subcontract as yet.
~~Light source specs not received~~
~~Date interim report?~~ } ?
Reels - 70mm 5" 9½" info

Send sample reels.

Date	Time	S
9 sept	1410	[redacted]

STATINTL

STATINTL

[redacted]

5 August 1963

[redacted]

STATINTL

Dear Del:

Enclosed are drawings showing the physical dimensions of the counters for the reader. I am not sure yet whether it will consist of 3 or 4 rack drawers as outlined. The control panel is to have a 4 (four) foot cable connecting it to the counter.

At present the delivery date is set for October 15th, so you should be able to get it shortly thereafter. If any questions arise over the packaging problem, please contact me.

Sincerely,

[redacted]

STATINTL

Enclosures

Vibration

Adjust Y handwheel clutch.

Joystick to give equal speed on both axes for 45° displacement and the speed range was to be controled by the magnification.

Scan control switch requires more positive neutral detent position.

All three film drive controls require adjustment to make them positive.

Freon level indicator is in a poor position. The chance of it being broken or loosened, developing a leak, is great where it is.

Freon air pressure regulator requires replacement or adjustment.

Freon is not completely dried when rewound on supply spool.

Film scan control speeds must be adjusted.

After alignment, take intensity and resolution readings at all magnifications. On light intensity readings record lamp current.

Have to vent the film supply caset for reloading.

Lower magnification switches.

Focus control speed range to be changed.

Put light shield on rear of cabinet.

Move heat filter and air cool.

Speed Scan Range

6X slow
12X ok
24X fast
48X way to fast

List of items requiring corrections on the Film Reader

TELEPHONE OR VERBAL CONVERSATION RECORD

Subject of Conversation [redacted] Reader		Date 31 May 63
Person Calling [redacted]	Office or Company PD/OL	Telephone Number

Information or Action Sought

Whether or not it was our desire that the contract contain an item covering delivery and installation of the instrument?

Information Given or Action Taken

Requested that delivery to [redacted] and installation and check out of the instrument be included in the contract price.

Date	Time	
31 May 63	15.45	[redacted]

13 June 1963

STATINTL

[redacted]

VARIABLE WIDTH FILM VIEWER SPECIFICATIONS

1. SCOPE

This specification details requirements of a rear projection variable width film viewer.

2. APPLICABLE STANDARDS

The viewer, auxiliary equipment and support equipment shall be built to best commercial standards except on optical quality which shall be built to standards as specified in MIL-STD-150A. Due considerations will be given to the requirement for operation and maintenance by semi-skilled personnel. Final acceptance tests shall be performed at the final destination as specified by the contracting officer.

3. DESIGN REQUIREMENTS

3.1 GENERAL CONFIGURATION

3.1.1 Overall width shall not exceed 34½" with all panels collapsed or removed to facilitate movement through 36" office doors. Maximum time for preparing the machine for movement through doors not to exceed 15 minutes. The overall height shall not exceed 80".

3.1.2 Projection of the image shall be through a rotatable platen to allow image rotation without using optical components such as dove prisms, which introduce distortion and reduce resolution.

3.1.3 The film transport shall handle 35mm through 9½" wide film.

3.1.4 The center of the viewing screen shall be of the same height as the eyelevel of a 5'10" operator seated in a conventional office chair.

3.2 OPTICAL QUALITY

3.2.1 The prime objective of this design is to produce a practical film viewer having the ability to resolve 8 lines per millimeter per power on axis. Minimum acceptable resolution however shall be 6 lines per millimeter per power on axis. At no point over the projected image area shall the resolution fall off by more than 15% the on axis values. It is understood that the resolution is to be read on the projected image plane as related to the film gate with a closed platen.

3.2.2 The optical system is to be so designed that when the image is in sharp focus there shall be no color fringing apparent on the screen when viewed with a 10X magnification assist. Geometric distortion of images shall not exceed 1/10 of one percent when projecting a calibrated grid and measured at the screen.

3.2.3 Lenses to be used shall meet the above resolution and distortion requirements and provide the following magnifications within ± 5%: 6X, 12X, and 30X. All three lenses shall be of a type known as apochromat (Achromatic will not be acceptable). All projection lenses shall have all air to glass surfaces anti-reflection coated.

3.2.4 The lenses shall be mounted in a four position turrent which includes one spare position available for future use. Lens selection and positioning shall be controlled by four switches mounted on the control panel.

3.2.5 The lenses shall be par focused so that when they are interchanged, the image shall be in focus. In addition, an operator fine focus control shall be provided for viewer adjustment.

3.2.6 The condenser lens system shall be designed to consist of elements with proper surfaces (spherical and/or aspherical) so that the corrected system will be as free of spherical and chromatic aberrations as possible, i.e. a uniform high intensity illuminating beam is required. The condenser lens shall be adjustable or interchangeable in order to concentrate the maximum light onto the film plane commensurate with magnification change. The 12X magnification will be optimized.

3.2.7 The mirrors used for reflecting the projected image shall be a high quality aluminized front surface mirror protected by silicon monoxide coating. The minimum acceptable standard shall be no less than 1" thick with no more than 4 light fringes per inch. Mirrors shall be mounted on a three point suspension system for ease of alignment. Care shall be taken to prevent a loss of resolution due to vibration in the mirror system. The mirror mounting system shall be of sufficient tolerance to insure that no free play exists in the mirror mounts.

3.2.8 The viewing screen shall be a minimum of 30" x 30" and be Polacoat LS75BG on $\frac{1}{4}$" water white plate glass unless notified otherwise by the contracting officer. It shall be so mounted in the frame as to permit rapid removal from the front of the machine.

3.2.9 All optical components shall be so mounted as to allow adjustment of the 3 major axes of rotation to allow precision alignment.

3.3 LIGHT

3.3.1 The minimum acceptable limit shall be 200 foot lamberts at all magnifications as measured at the viewer's side of the screen. (1 foot lambert = 1 pie candles per square foot). The desirable illumination at the screen is 1,000 foot lamberts. Between any two points on the screen the light intensity shall not vary more than 15%.

3.3.2 The light source shall be positioned in the optimum burning position as specified by the manufacturer.

3.4 COOLING

3.4.1 An exhaust type filtered air system shall be provided ensuring adequate colling of the light source to minimize premature burnout of the light source and other glass breakage due to heat.

3.4.2 A filtered forced air system shall be provided for film gate and condenser cooling. Maximum acceptable film temperature within the film gate is 130° F. with an ambient room temperature of 80° F. or below, with a piece of silver halide film with a fogged density of 1.0 completely filling the entire film gate.

3.5 FILM TRANSPORT

3.5.1 The viewer shall handle up to 500 foot rolls of 5', 6.6', 8' and 9½" wide film on Air Force standard spools, and 1000 foot rolls of 35mm and 70mm wide film on standard Air Force spools. (Maximum reel diameter 10½")

3.5.2 Continuously variable flo-film movement in forward and reverse shall be provided. Minimum acceptable drive speed shall be .1 to 5 inches per second with sufficient control to insure smooth image movement on the screen throughout the specified ranges. The drive system shall use DC servo controlled printed circuit motors. Smooth image movement is interpreted to mean there shall be no noticeable jerking or sporadic movement of the projected image to the unaided eye.

3.5.3 Rewind and fast forward drive shall be provided by a variable control. A maximum rewind speed of 250 feet per minute shall be provided. Sufficient control of the braking system shall be maintained to insure smooth stop motion when the variable control is returned to the stop position.

3.5.4 Image positioning controls shall be provided which allow the operator to bring any portion of the film frame into view at the center of the projection screen. The lateral movement of the film stage shall be accomplished by a DC servo drive utilizing printed circuit motors. It is also required that the operator can rotate the film stage through a full 360 degrees. Electrical rotation control shall be provided.

3.5.5 Film Transport control logic shall interlock the film transport operations so that it will be impossible for an operator to damage film by improper sequencing of film transport controls.

3.5.6 The film aperture shall measure no less than 5' x 5' and shall have a glass platen to hold the film flat while viewing. The platen shall be designed to accommodate 35mm to 9½' film of various thicknesses. An adjustable dark slide is to be provided to accommodate various width film. On transport scanning and film slew positions the film gate shall be such as to prevent the film from coming in contact with the upper platen. This does not apply to the condition in which the platens are in positive contact. Adequate control shall be exercised to maintain the entire projected image in sharp focus in the scanning mode.

3.5.7 All surfaces coming in contact with the film shall be either highly polished or of material which will insure a minimum of surface scratching. Except for the metering roller which shall be rubber.

3.5.8 A footage counter shall be provided. Foot indication will be displayed in lower left hand corner of screen. Counter shall be reset by control panel switch.

3.6 ELECTRICAL

3.6.1 The film viewer shall operate from a nominal 117 volt, 20 ampere, 60 cps. single phase circuit. All circuitry is to be so designed so that intermittent surges ranging from 95 volts to 125 volts will not materially affect the operation of the instrument. All electrical and electronic parts will be of the heavy duty, maximum reliability type. Indicator lamps shall be provided for each fuse holder and relay, and the fuse holder shall be marked to indicate the correct amperage.

3.6.2 A chassis and cabinet grounding wire shall be included in the AC line cord and terminated in a standard 3 pin connector. The chassis grounding wire shall be run to all major electrical sub-assemblies within the cabinet so as not to rely upon the cabinet itself as a conductor. All electrical parts shall be attached to the chassis so as to insure a positive ground (eliminating the effect of paint and anodizing).

3.6.3 To expedite maintenance, an electrical circuit diagram shall be permanently attached to the inside of one of the cabinet covers.

3.6.4 The viewer shall be designed to operate on a production line basis. Therefore, it shall feature top reliability and maintainability even though operated by semi-trained personnel on a 16-hour, 6-day week schedule. All circuits will be designed to be fail-safe, properly fused and dust covers or sealed components used where required.

3.7 STRUCTUAL QUALITY

3.7.1 The cabinet frame shall be constructed of no less than 10 gauge 1½" square, steel tubular welded frame. Cabinet panels shall be formed of no less than 16 gauge reinforced steel. If upward facing mirrors are mounted on the floor of the cabinet they shall be reinforced with laminated honeycomb or square steel tubular material. The cabinet, film transport and optical elements shall be of sufficient rigidity to insure that moving the machine within a building (through elevators etc.) will not degradate the optical quality of the projected image.

3.7.2 The structural rigidity of the viewer shall be sufficient to insure that light taps on the control panel or other sections of the cabinet does not introduce any vibration or image jump on the screen as viewed with the unaided eye.

3.7.3 The viewers shall be equipped with 5" diameter casters for easy relocation within an office building. In addition leveling jacks shall be provided for permanent location purposes.

3.7.4 Projection and overhanging edges which would injure operator or maintenance personnel will be reduced or eliminated where possible. All edges and corners of the cabinet will be rounded.

3.7.5 Special considerations will be given to design for ease of maintenance. Access doors, panels, or covers will be provided for easy access to parts requiring periodic access.

3.7.6 All operating controls shall be conveniently located within the reach of a comfortably seated operator. Controls will be grouped by function and suitably identified. Operation of controls will follow established conventions, such as clockwise for increase, etc.

3.7.7 All hardware (screws, bolts, etc.) will be of American Standard sizes with a minimum of type and sizes used. If any special tools are required for disassembly or assembly, one each shall be furnished with each machine. Sheet metal or self tapping screws will not be used. Assembly hardware shall be replacable by AE standard assembly hardware.

3.7.8 All surfaces shall be of a corrosion resistant type or will be suitably treated to protect against corrosion. Special consideration is to be given to weld joints for corrosion resistance. Painted surfaces shall be protected with suitable undercoating before application of finish coats. The entire interior of the cabinet (other than lenses and mirrors) which is exposed to the light path shall be coated with a non-reflecting black coating to the extent that no reflected light shall enter the optical system.

3.7.9 Parts requiring lubrication shall be easily accessable and oil holes and grease fittings will be provided. Wherever possible, sealed bearings of the pre-lubricated type will be used.

4. MISCELLANEOUS

4.1 Complete system engineering drawings shall be submitted for the contracting officer's approval prior to beginning construction of any units.

4.2 A kit of initial spare parts and maintenance materials shall be delivered with each viewer. Items to be included but not necessarily restricted to are:

a. 4 each projection lamps
b. 4 each platen glasses (of each type used)
c. 2 each heat glasses (of each type used)
d. 1 pint lens and mirror cleaner
e. 5 each fuses (of each type used)
f. 1 can of touch up paint
g. Recommended 6 month operating spare parts list.

4.3 An operator's instruction book and a comprehensive technician's maintenance book are to be delivered with each instrument. Instruction books will be written to good commercial practice and contain a minimum of cross references.

4.4 Testing will be progressive throughout the development program. Periodic inspection to be performed at the contractor's plant by the contracting officer's technical representative. A preliminary acceptance test is to be performed at the contractor's plant prior to shipping. Final acceptance testing to be performed after delivery and installation of the viewer. Attached are the acceptance testing procedures, against which the viewer performance as outlined in these specifications shall be evaluated.

STATINTL 4.5 Price quotes to be FOB [redacted] and include three complete sets of engineering drawings, and installation by the contractor's technical personnel.

4.5.1 Installation shall consist of a complete mechanical and electrical checkout and optical alignment to insure that the viewer is operating in peak condition prior to acceptance tests.

VARIABLE WIDTH FILM VIEWER

TEST SPECIFICATIONS

1. SCOPE

This specification defines the test requirements and the targets and instruments that shall be used in the performance of the tests.

2. INSTRUMENTS AND TARGETS

The following shall be used in the performing of the required tests:

a. Spectra brightness spot meter of the [redacted] type STATINTL
b. Volt meter, of accuracy equal to RCA Model WV-87B Voltomeet.
c. A 10X magnifier having a resolution capability of reading 72 lines per millimeter high contrast.
d. High contrast resolution target of the Gurley No 8010-N type on 5" wide film arranged in accordance with figure 8 of change 1 to par 5.1.2.12.3 of MIL-STD-150A 8 June 1961. The targets shall cover the range from 4 + 0 228 lines per millimeter.
e. Opaque film 5" width with a clear hole 0.5" in diameter in the center thereof.
f. Grid millimeter; 5" square film with black lines on clear background similar to millimeter grid contained in Dietzen professional sketch pad #374A
g. Glycerine cell 5" x 9" x 0.5" containing two standard platen glasses.
h. Therm-o-meter; Simpson model #388 or equal.
i. Powerstat, superior electric model #136 or equal.

3. TEST REQUIREMENTS AND PROCEDURES

3.1 Lamp adjustment: The opaque film with the 0.5" clear center (2e above) shall be placed between the platens with the clear portion in the center of the 5" x 5" aperture; a mirror shall be placed at 45° angle below the platen but above the objective lense; the spectra brightness spot meter (2a above) shall be focused on the clear opening of the film and with the lamp at some suitable voltage the lamp shall be physically moved until the meter gives a maximum reading, this shall be done for all three magnifications and an average of the three shall be taken as the most suitable comprimise position.

4. FILM TEMPERATURE TEST

4.1 The glycerine cell (2g above) shall be inserted in lieu of the regular platen; a 5" x 9" piece of film having a silver halide emulsion developed to a fog density of 1.0 shall be inserted and the cell shall be filled to maximum with CP grade glycerine, the lamp voltage shall be brought to 117 volts for at least 10 minutes; the probes of the therm-o-meter (2h above) shall then be inserted just outside of the concentrated light beam and a temperature reading shall be taken.

4.2 With an ambient room temperature of 80°F the temperature of the glycerine shall not exceed 130°F.

5. OPTICAL ALIGNMENT

5.1 The geometrical center of the viewing screen shall be located by measurement and shall be marked by china marking pencil or other suitable means, a suitable cross hair target shall be placed in the platen and each of the lenses shall be adjusted in X and Y to bring the cross hair in register with the center marking of the screen.

5.2 The platen scanning shall be actuated and while rotating the platen in several degrees to the right and to the left the center screen marking will be observed to follow the cross hair, if it should not do so further adjustment of the lens shall be made until the center screen marking follows the cross hair for all lenses.

5.3 With grid target (2f above) in the platen and lenses having been optically centered as above the geometric distortion shall be read on the screen with a millimeter scale, should the distortion exceed 1/10 of one percent at any point on the screen the mirrors will be adjusted to reduce it to this value.

5.4 If at any time it is necessary to adjust the mirrors the optical centering of the lenses required in "5" above shall be repeated.

5.5 Test for free play in the mirror mounts shall be made by applying pressure to the corners of the mirrors, with the grid target (2f above) in the platen, after release of the mirror the displacement of the target shall not exceed 1/10 of one percent on the screen.

6. ILLUMINATION INTENSITY

6.1 With the lamp and lenses adjusted as in "3 and 5 above", the lamp voltage shall be adjusted to 117 volts by means of the powerstat (2i above) and the spectra brightness spot meter (2n above) shall be focused on the viewing screen with no film in the platen.

6.2 Readings shall be taken at all target locations shown in figure 8 of 5.1.2.12.3 of change 1 to MIL-STD-150A except, for the extreme corner positions "E". This shall be repeated for all lenses and/or magnifications.

6.3 The minimum reading shall be not less than 200 foot lamberts however, between any two points on the screen the light intensity shall not vary by more than 15 percent.

7. RESOLUTION

7.1 With the optical system alined as required above, the lenses at one stop less than their maximum opening and with the lamp voltage at 117 volts the resolution target (2d above) shall be inserted in the platen and with the platen closed resolution readings in lines per millimeter shall be taken of the screen image with the aid of a 10X magnifier (2c above).

7.2 Resolution readings shall be taken at all target positions shown in figure 8 of par 5.1.2.12.3, change 1 to MIL-STD-150A except, for the extreme corner positions "E". At the higher magnifications the center target shall be moved to occupy the indicated positions for reading.

7.3 The on axis reading shall not be less than 6 lines per millimeter per power. The resolution at the off axis positions shall in all cases be at least 85 percent of the on axis values.

7.4 The resulting effect of any astigmatism, lateral chromatic aberration or color fringing which causes a difference in the resolution readings for the radial and the tangential lines, of more than 20 percent, shall be construed as not meeting the requirements of par 3.2.2 of the above viewer specification.

SECRET

19 April 1963

MEMORANDUM FOR: Assistant for Plans and Development

THROUGH : Executive Secretary, TDC

SUBJECT : Staff Study - Procurement of a High Quality Film Reader

1. PROBLEM:

To develop the highest quality Film Reader that the present state of the art will permit to meet our increasing resolution requirements.

2. FACTS:

25X1A NPIC currently has a contract with the [redacted] for the design and construction of 6 Film Readers. This contract was awarded to 25X1A [redacted] on 27 June 1961. The original contract was for off-line operation with paper type output which was subsequently changed to on-line operation in 25X1A the spring of 1962. To date [redacted] has been unable to provide a prototype Reader and digitizing system for evaluation. The Film Reader they are now 25X1A designing will consist of the basic [redacted] Film Viewer with a digitized film transport and heavier frame and mirrors. No change is contemplated in the lighting or lens system. Attached as separate enclosures are copies of 25X1A the [redacted] evaluation of the [redacted] Film Viewer in terms 25X1A of the optics and light system, and specifications furnished the manufacturers as criteria for new proposals.

3. DISCUSSION OF THE FACTS:

25X1A Progress under the [redacted] contract has been extremely poor due to a number of factors, the major one being lack of reasonable caliber technical personnel. Observations within the past 18 months indicate they do not have a sufficient number of either technical or production personnel to satisfactorily complete their commitments and have had a high turnover of design personnel assigned to work on the reader. Quality control has never been adequately applied nor has any program scheduling been attempted. These observa- 25X1A tions have been concurred with by various outside personnel visiting [redacted] 25X1A [redacted] on our behalf.

25X1A During the past nine months the [redacted] has been studying the illumination problem and as part of the study has evaluated the latest model 25X1A Film Viewer produced by [redacted] A detailed report on this evaluation has been included. Of importance is the fact that the results obtained on the viewer are very close to what we can anticipate for the Film Reader. The basic

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25X1A

purpose of the [redacted] contract however was to design the best possible illumination system for rear projection devices. This study has progressed far enough to provide input for a new model Film Reader. The technique they have developed is basically one of brute force, and consists of liquid cooling and a multiple light source, probably of the quartz iodine type.

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In view of the [redacted] performance and the [redacted] study, design specifications were drawn up for a new Film Reader. Manufacturer capabilities were studied and proposals were solicited from four companies [redacted] On evaluation [redacted] were dropped as not meeting our design criteria. [redacted] basically met our requirements but were asked to repropose based on the latest [redacted] results and minor technical areas requiring clarification.

25X1A

An additional consideration is that the reader is to be designed to incorporate a new high quality lens at a later date. These lenses are to be designed under a contract now being negotiated with the [redacted]

The digital accumulator or readout is not to be included as part of this contract but will be purchased as a separate item and furnished to the reader manufacturer for incorporating in the reader. It will be the same readout system as used in the chip comparator for on-line use.

4. CONCLUSIONS:

25X1A

On final evaluation [redacted] was evaluated to have the best technical approach based on their electro-mechanical design capability. The management volunteered to utilize PERT management procedures which will allow the desired close control by the project monitor and the contractor. They also indicated the greatest willingness to work with the [redacted] on the illumination source.

25X1A

5. RECOMMENDATIONS:

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It is recommended that a CPFF contract for [redacted] be negotiated with [redacted] for the design and fabrication of a prototype Film Reader as outlined in their technical proposal. [redacted]

25X1A

[redacted]
Development Branch, P&DS

19 April 1963

[redacted] STATINTL

Subject: I. N. 462

Gentlemen:

In compliance with your request, enclosed are five copies of our Technical Proposal I. N. 462, Revision A, titled "Variable Width Film Reader," Also enclosed is a breakdown of our estimated costs for accomplishing the above.

I wish to bring to your attention that even though our proposal indicates the machine is f. o. b. [redacted] we have included estimated installation and on-site test services in our proposal. However, since we do not know the destination of the equipment we have not included any travel costs or per diem on the installation. STATINTL

If we may be of further service, please do not hesitate to contact me.

Very truly yours, STATINTL

[redacted]

[redacted] STATINTL

DBA:lhf General Manager

Enclosures

cc: [redacted] STATINTL

9 April 1963

STATINTL [redacted]

Subject: I. N. 462

Gentlemen:

STATINTL [redacted] is pleased to submit for your attention the accompanying technical proposal 462 A for design, development, and fabrication of a prototype "Variable Width Film Reader." This is a revision of our earlier proposal 462, now including the desired revisions such as quartz iodine, light source, physical modification of the overall unit size, and "dry film" takeup feature. Our price to accomplish the above is [redacted] based upon a CPFF contract. Completion of the prototype unit would be nine months ARO, f. o. b. [redacted]

The successful completion of this project will require close coordination with the purchaser, and with groups engaged in development work on lenses, light sources and film handling. The technical staff of [redacted] is prepared to cooperate fully in incorporating new techniques and utilizing any data available to us. As experienced designers and builders of precision opto-mechanical devices, we believe we are especially well prepared to appreciate and use the newest advances of optical and mechanical technology.

Our goal is an end product, a prototype which will perform to the given specifications; which will be a reliably functioning item of laboratory equipment; and which will, as far as possible, approach a "production - engineered" instrument in construction and ease of operation. The design

STATINTL [redacted] 9 April 1963

will, wherever possible, make allowances for future modification and for adding concurrently designed special elements. Human engineering aspects of this equipment will be submitted to the purchaser in ample time for his careful evaluation.

STATINTL [redacted] will be glad to discuss further any technical or contractual matters relating to this proposal. Our plant and personnel (a secret - cleared facility) welcome your inspection. If additional information is required for your evaluation, I will be pleased to give any questions my immediate personal attention.

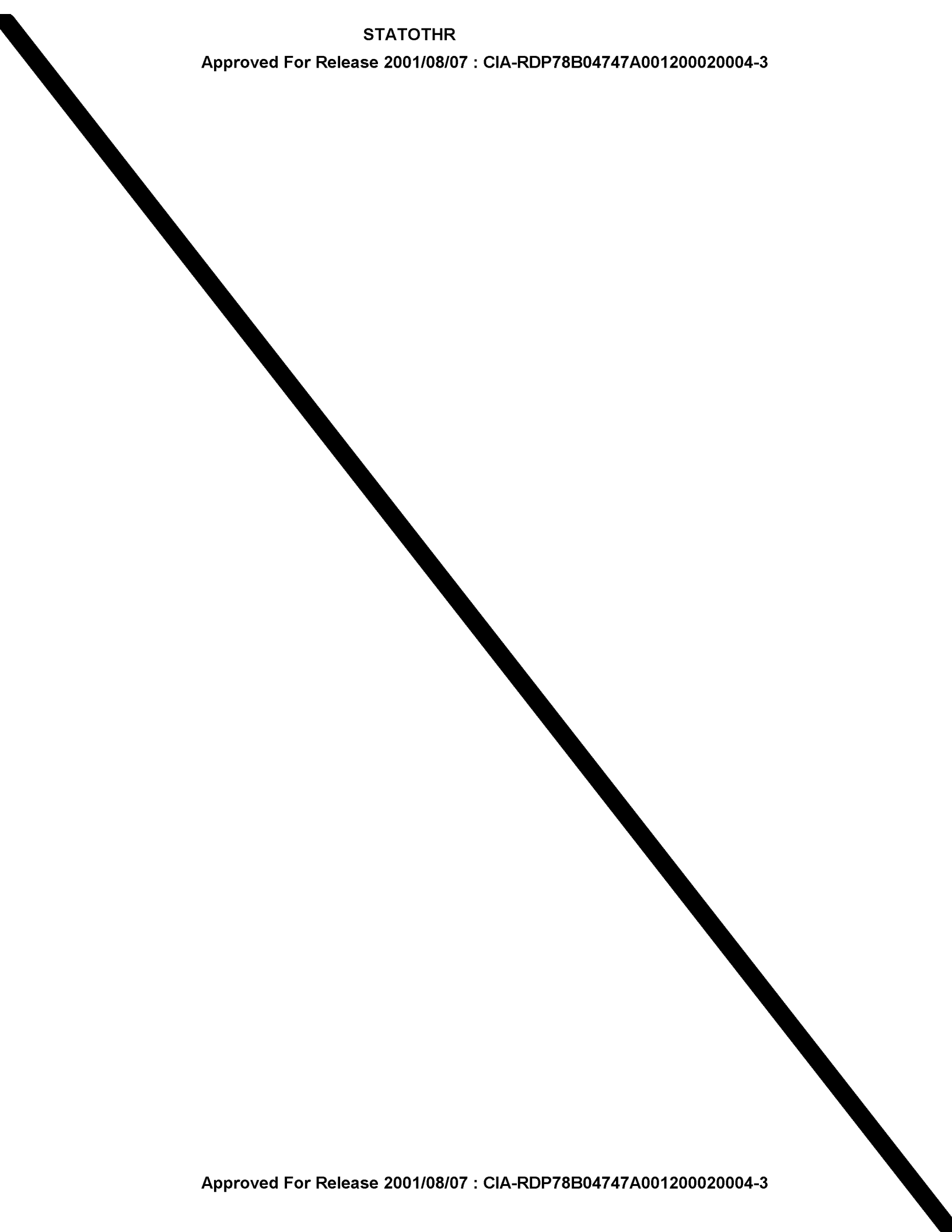
Very truly yours,

STATINTL [redacted]

STATINTL [redacted]
General Manager

DBA:lhf

cc: STATINTL [redacted]



6 April 1963
I.N. 462, Rev. A

STATINTL

[redacted]

1963
(Secret)

TECHNICAL PROPOSAL
I.N. 462 - Revision A

VARIABLE WIDTH FILM READER

Approved For Release 2001/08/07 : CIA-RDP78B04747A001200020004-3

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Approved For Release 2001/08/07 : CIA-RDP78B04747A001200020004-3

Section I

INTRODUCTION

This proposal includes revisions and changes made in the Variable Width Film Reader specifications up to 5 April 1963. These changes relate to the overall size of the machine, the illumination source, and the film transport mechanism. Drawings F145A (figure 1) and B931A (figure 2) are changed to show the new requirements. In other major features - such as film measurement, rotation, lens selection - it remains the same as described in the [redacted] proposal dated 15 February 1963.

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The instrument described in the following sections is an operating engineering prototype, but throughout its design and construction every effort will be made to include the refinements necessary to a production model.

Section II

TECHNICAL PROPOSAL

INTRODUCTION

This technical proposal outlines a system which will have the operating features specified in "Design Requirements for a Variable Film Width Reader" and revisions. Image rotation, high resolution, illumination and high-speed film transport are the major design problems.

STATINTL Preliminary study by [redacted] has resulted in an outline proposal for a system to meet all the operational specifications for the Variable Width Film Reader. In this discussion, we will present design and support data for each necessary subsystem, along with the performance that can be expected from optimized components.

The equipment configuration shown in the specification drawing will be followed, in general, in the layout of the final measuring machine. An overall height of 64" and length of 108" should be sufficient to contain all necessary components. The width at the front of the machine will not exceed 34 inches. As will be explained, the design process must begin with the requirement for high intensity illumination, which demands a

liquid cooling system. This in turn affects the film drive design, and the complete film transport dictates characteristics of the rotating mechanism.

1. FILM COOLING

The major problem in the specification is the intense illumination required on the screen. For metered film drive, the film can not be in contact with a glass platen. Government sponsored research is now in progress on a liquid Freon film gate, in which the film is suspended between horizontal planes of laminar flow in a stream of liquid Freon, (see figure 1). The Freon flows between parallel glass plates, which form a platen containing the film and holding it in the viewing plane. It absorbs heat from the illuminated film area and recirculates through a heat exchanger, where the Freon is cooled.

Figure 2 shows the supply and take-up reels both suspended over the cooling fluid, as they will be during measurement. Freon 113 will be used as the cooling liquid. It will be filtered as it recirculates, to remove any dust which enters from the film. A pressure differential across the gate of approximately 8 psi is expected to produce appropriate flow rates. A spacing between the glass plates and the film of .001' to .005" seems to be stable for a range of flow rates.

In the proposed Screening Projector, the major purpose of the "liquid gate" approach is to cool the film by a process of conduction (film to fluid) and convection (heated fluid is pumped from the platen to a heat exchanger). A mixture of nine parts of toluene and one part of Freon-113 liquid is recommended; this mixture is colorless, has low toxicity, is less expensive than Freon-113 liquid alone, and has an index of refraction of 1.50. Therefore scratches and other marks on either side of the film itself are not visible in the projected image. STATINTL [redacted] has established that there are no dimensional changes to their film (all types) as a result of being exposed to a liquid Freon cooling system.

2. FILM TRANSPORT

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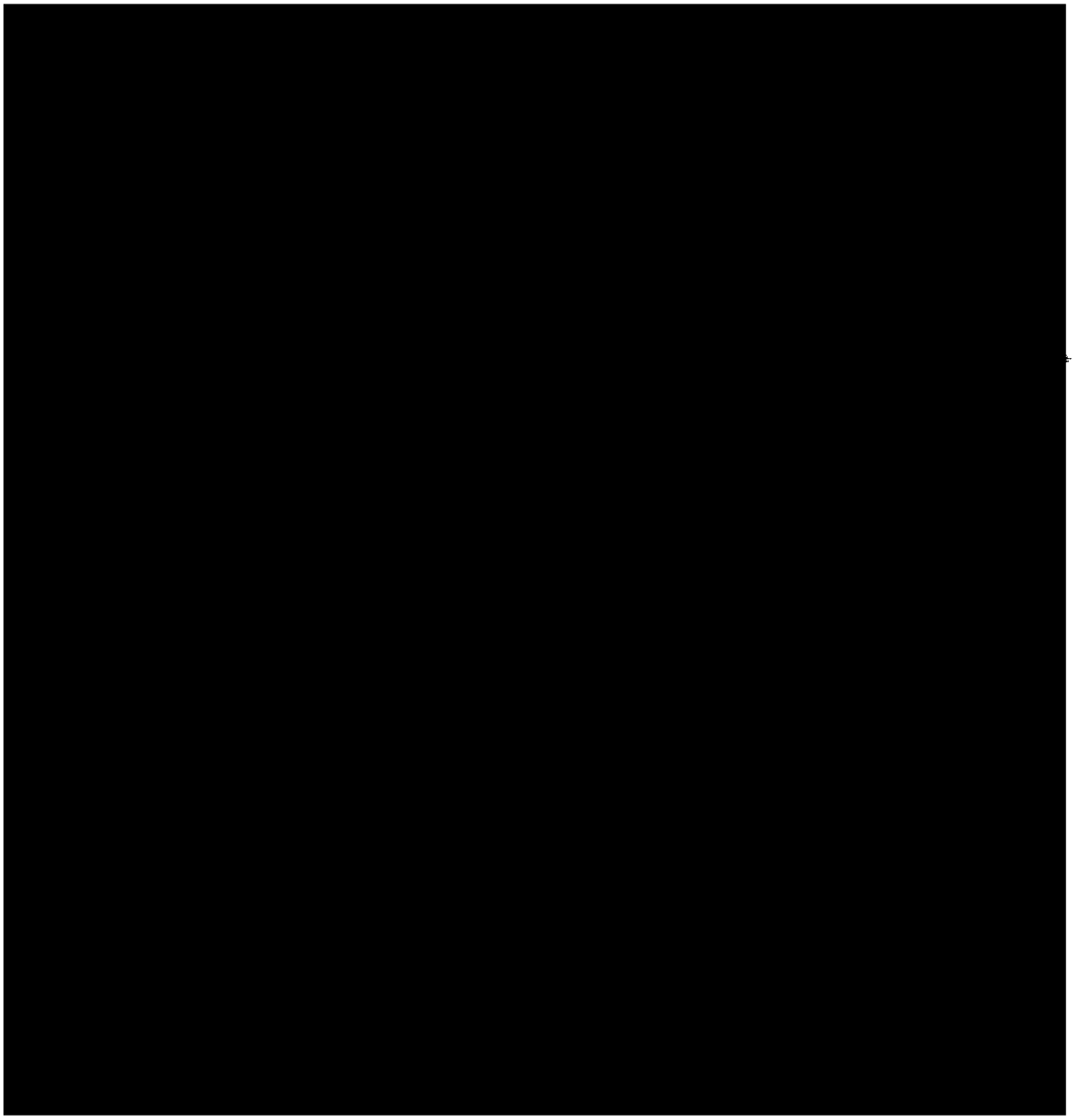

2.2 Film Drive

Figure 2 is a schematic diagram of the entire film drive system. Supply and take-up reels at either side hold the film, which

may be from 70mm to 9 1/2" wide. Power for driving the two reels is supplied by their respective servo motors and amplifiers, but film speed is controlled by a capstan drive in the pressurized side of the film chamber. The film is driven by the pressure differential capstan shown in figure 3, and metered by an [redacted] encoder which gives film travel in increments of 10 microns over a range of 30". Tension sensing rollers supply feedback signals to the servo amplifiers which drive the film reels. The film speed control for measurement is interlocked with magnification selection (see Section 6 for more detail).

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Magnification	Joystick Ranges	Median Speed
48X	0.02"/sec-0.1"/sec	0.05"/sec
24X	0.05"/sec-0.2"/sec	0.1"/sec
12X	0.1"/sec -0.4"/sec	0.2"/sec
6X	0.2"/sec -0.8"/sec	0.4"/sec

A second one-axis joystick will be used for film rewind and fast advance. Maximum deflection of this "film slew" joystick will produce a minimum speed of 250 ft/min. It will override the "measurement" joystick. At this time insufficient data is

available to establish a final design; however it appears that for protection of film and film platens, the fast slew and rewind should take place with Freon running through the gate as it does during viewing and measurement.

Connected to the driving shaft (see figure 2) are the X encoder, the pressure differential capstan (described in more detail below), the speed control servo motor, a clutch-brake, and a selsyn. Inputs to the servo amplifier may come either from one potentiometer on the joystick or from the primary winding of the receiver selsyn, which senses position of the handwheel (see figure 4). When the speed control joystick is off zero, the clutch disengages the selsyn from the drive shaft. When the joystick is at zero, the clutch engages the secondary of the selsyn to the drive shaft.

Output of the servo amplifier is a DC signal, controlling velocity of the Model [redacted] printed circuit motor. This motor turns the capstan and encoder, giving the X coordinate for film measurement. The capstan circumference is 163,840 microns. The encoder is a Model [redacted] with 16,384 counts per turn, each count representing 10 microns.

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Because of the solvent properties of Freon, all electrical components are in the room atmosphere, separated from the Freon by seals. The pressure differential capstan which supplies film speed control consists of a slotted roller moving over a stationary cylinder, also filled with fluid at lower pressure. Since the Freon hydrostatic pressure in the chamber is approximately 8 psig, the differential pressure between this and atmosphere holds the film tightly against the roller as it turns. By blocking off different regions of the low pressure side, the same roller can be adjusted for the various film sizes. See figure 3 for capstan details.

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The film reel drive motors are Model [redacted] printed circuit motors driven by servo amplifiers. Input signals for these amplifiers come from tension sensing rollers on either side of the platen, and maintain a constant film tension across the platen region.

Liquid Freon 113 recirculates from the atmospheric side through a heat exchanger to the high pressure chamber. The pressure chamber and the configuration of platen and film

rollers will be designed to sustain constant laminar flow through the platen region. Spacing between film and the glass plates must be approximately .004 inch, according to information currently available.

Both Freon and air are pressurized in the right-hand side of the chamber. A strip of 70mm leader material is permanently attached to the take-up reel, and the "supply" film will be taped to the leader end, on loading, so that the operator need not thread film through the platen each time. An "air knife" at the supply side, removes liquid Freon so that the reel will be dry when removed.

When the Freon pump is turned off, the liquid is removed from the platen region into a reservoir so that all guide rollers are accessible. To change film width, different size rollers and adapters are placed on each spindle. The center of the film will always be on the same line, no matter what width film is used, so that the center of rotation always lies in the film frame. Interlocks and "end-of-film" detectors will be included to prevent the operator from pulling the end of the film off the supply reel.

3. STAGE AND ROTATION

The image on the display screen should be rotatable $\pm 180^{\circ}$ about its normal position so that imagery can be oriented in the most readable direction for the operator. However, X and Y measurement must be referred to film coordinates; therefore a crosswire measurement on the screen is not appropriate, since it involves encoding rotation and adding this data to the screen measurements in order to find true film positions. Therefore we must rotate the film itself, and with it the measuring system. A simple and practical method of rotating the film, film drive, and measuring devices is based on

STATINTL [redacted] development work with air bearing granite engines.

Assume that the film reels, platen, motor, vacuum rollers and "X" drive components are mounted in a single housing, which forms a "Y" stage. The "Y" stage "floats" on a set of air bearing pads which ride on a flat granite surface (see figure 1). In the center of the cylindrical granite table is an opening for illumination, and the film gate moves over this opening. A pair of ways attached to the cylindrical granite table at either side of the opening rotate around the center measuring axis with the table. The entire film assembly moves back and forth along these ways, with the direction of

movement driven and encoded. Therefore X and Y measurements always represent distances along the film and across the film, respectively. The image presented to the operator, however, can be turned $\pm 180^{\circ}$ without affecting measurement. Rotation is used only as a convenience in viewing, and is not encoded.

Figure 1 shows the general layout of the machine, and details of the Y-stage and rotation. The exploded view, at the right of the drawing, shows components for rotation and Y-motion.

A steel base plate is mounted to the instrument frame. The circular collar has three radial air bearings for guidance as it turns in the base plate opening. This collar is rigidly connected to the cylindrical granite block. Air bearings support the weight of the granite upon the base plate. Therefore the granite is free to turn around the center of the opening. A motor-driven belt coupling drives the granite, in response to the operator's setting.

The two granite ways mounted on the top of the rotatable granite table are shown on figure 1. They guide the "Y" travel of the film transport magazine (the unit containing film reels, drive motors, X-encoder and liquid-cooled platen).

The Y-stage will be driven by a 0.1" pitch precision ball screw using a preloaded nut pair to eliminate backlash. A 254 count per turn STATINTL encoder directly coupled (1:1) to the ball screw will produce a least count of 10 microns. Fast Y slew will be 1"/sec. (maximum deflection of the "measuring" joystick).

4. PROJECTION SYSTEM

Four lenses in a rotating turret provide magnifications of 6X, 12X, 24X, and 48X. Appropriate condensers will be switched into the optical path to follow the magnification change. A front-surface mirror directs projected light to the screen. A rear projection screen, 30" x 30", will be located above the console control panel. The reticle projected on the screen from a point at the rear of the machine will present a pattern suitable for the imagery being measured. The pattern will consist of lines in the selected figure, and the width of the lines will be approximately 0.0025 inch. At 48X magnification, the 10 micron least count of the measuring system will be easily noticeable on the screen.

4.1 Lens Turret

Four lenses called for in the specification will be mounted on a rotating turret above the film plane. Conventional lenses of appropriate resolution for the four magnifications have been selected for the prototype which will give at least 10 lines per mm at the screen, viewing film through an all-air path. Special lenses, corrected for viewing through the glass-Freon section of the optical path, may be developed to the purchaser's specifications, and would be incorporated later.

Prototype Lenses

Magnification	Focal Length	F-Number Needed	F-Number Available
48X	50 mm	1.8	1.4
24X	100	3.5	2.3
12X	180	5.6	4.5
6X	300	8.0	6.3

4.2 Since only one mirror is used in the projection path, it is adequate to use commercially available polished plate glass, silvered at the front surface, for this application. Glass selected and treated in accordance with our usual practices will be of appropriate quality for this purpose, flat to within 1 wavelength (Helium yellow line) in one inch.

4.3 Screen

A number of screen materials are now available with resolution of 10 lines/mm or greater. [redacted] manufactures a type LS75BG transmission screen with contact resolving power of approximately 30 lines per mm. Its 50% fall-off angle is 13°, allowing the operator at least average freedom of movement from a central position. Until better material becomes available, a commercial screen of this kind will be used.

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5. ILLUMINATION

The specified magnifications are 6X, 12X, 24X, and 48X. At 6X, the illuminated film area is a 5" square; at 48X, the illuminated area is 0.6" square. The magnification ratio, highest to lowest, is 8; the area ratio is 64. In order to maintain the same brightness on the screen, the light intensity on the film at high magnification must be 64 times as great as that at low magnification.

The amount of power required at the light source, assuming it to be visible light, is defined by the specification of 10 footlamberts at the screen through a film of neutral density of one. This is the minimum value acceptable, with a design goal of 100 footlamberts. By the definition of density, the incident energy must be ten times as great as the energy falling upon the 30" x 30" screen. At high magnification, the condenser system will be switched to concentrate this light into the small visible area, 0.6" x 0.6". Other factors which enter into a specification for light source are the efficiency of the source, the wave length distribution of the source emission, and absorption within the condensing system. The specification calls for continuously variable intensity.

Using the configuration of equipment shown in figure 1, we can estimate the screen illuminance that would result from a 2500 watt lamp as 16 footlamberts with film density of 1.0. This value is above the specified minimum of 10, but does not approach the design goal of 100. Mercury arc lamps are not available as standard items for more than 6,000 watts. The choice between an arc lamp and a tungsten-iodine light source depends on availability. Within three months after contract STATINTL [redacted] will consult with the purchaser to decide upon the light source to be used in the prototype Variable Width Film Reader.

If a mercury arc lamp is used in the prototype machine STATINTL [redacted] STATINTL produces a unit with source area 6.5mm x 10mm, and average power consumption of 6 kilowatts. With this spectrum, the expected screen luminance will be between 35 and 40 footlamberts. However, if a tungsten-iodine lamp of equal output is developed during early stages of the equipment design STATINTL [redacted] would prefer to incorporate it as the light source.

6. CONTROLS

See figure 5 for a preliminary layout of the control panel. Controls located on the console are:

1. Magnification selector - four illuminated pushbuttons which select the projection lens, condenser, and film speed - only one can be energized at any time.

2. Image rotation - turns entire X-Y measuring and guide system around the central measuring axis - is not encoded - changes orientation of picture on the screen by rotating the cylindrical granite table and film drive. Also turns the "measuring" joystick.

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3. "Measuring" joystick - the standard [redacted] joystick assembly will be used to produce two DC signals proportional to displacement of the handle along perpendicular axes. This assembly will turn to follow the rotation of the table and film magazine. Therefore displacement of the joystick in a given direction will always drive the image on the screen to the same direction. The signals from this joystick, both X and Y components, are interlocked with magnification setting so that the image

velocity at 6X for a given deflection is the same as the image velocity at 48X (see section 2. for median speeds). The Y-deflection of the joystick is spring-loaded to return to zero; the X-component of joystick deflection may be set to a position, and will remain at that position until the operator returns it to center.

4. Film slew joystick - forward or reverse for slew and rewind - carries film along X direction of measurement.

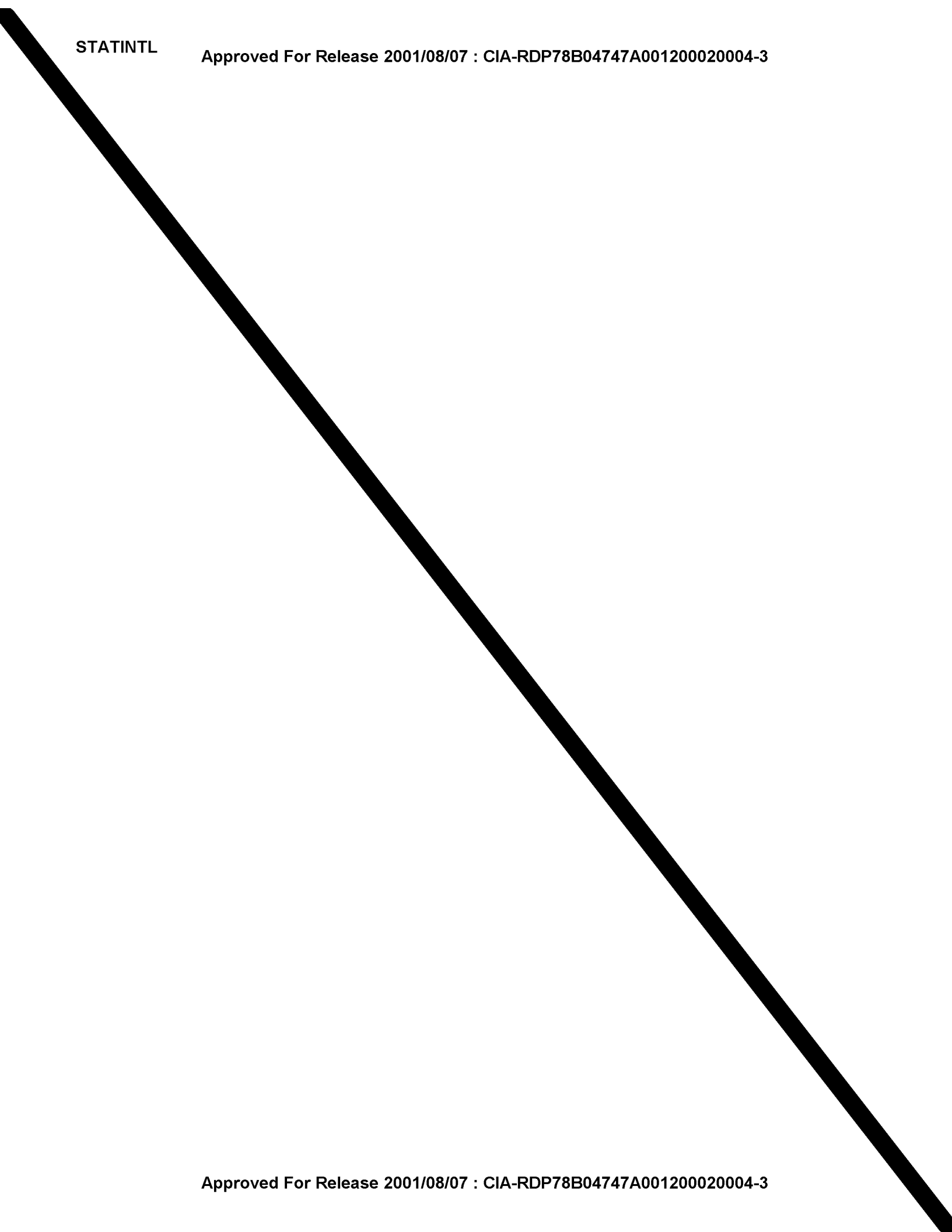
5. X handwheel - selsyn coupling to film drive capstan for fine positioning.

6. Y handwheel - carries film, rollers, reels, and motors along guide ways perpendicular to film direction.

7. Illumination control - varies intensity of illumination at the screen.

8. Film load - lighted pushbutton to release safety interlocks on housing, pump and stage drives, and evacuate Freon from chambers.

Since no data electronics are included with the system, except the encoders themselves, STATINTL will lay out the control panels to accommodate data control switches and indicators specified by the purchaser.



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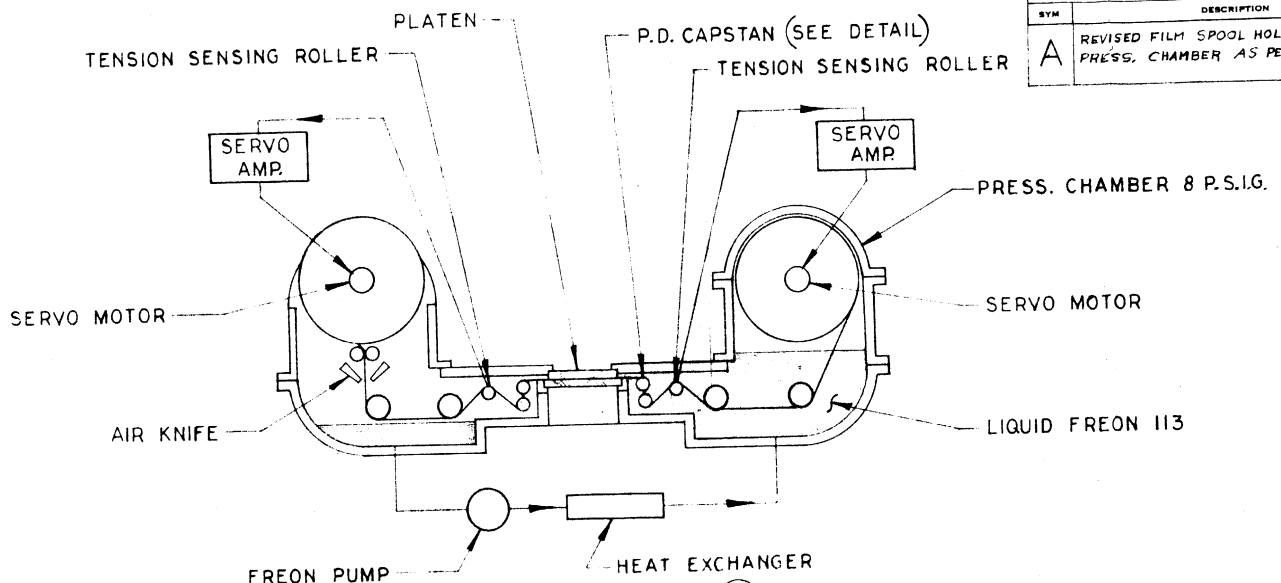
Section III

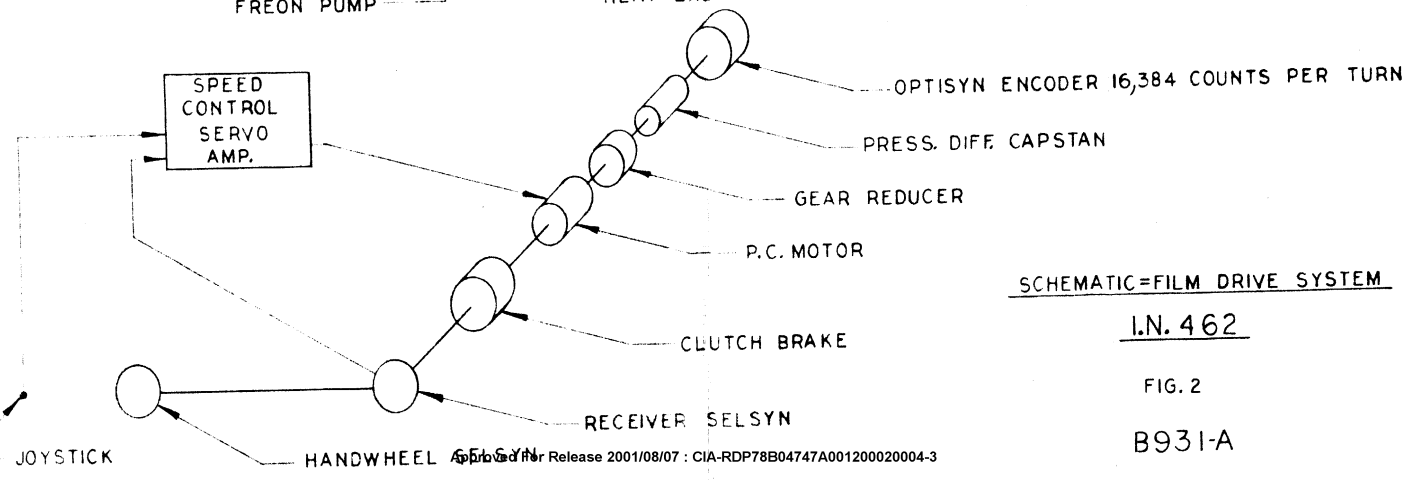
DRAWINGS

Figure 1 (Rev. A)	Equipment Configuration	F145A
Figure 2 (Rev. A)	Schematic, Film Drive System	B931A
Figure 3	Differential Pressure Capstan	A1641
Figure 4	Detailed Block Diagram for Film Drive Control	A1642
Figure 5	Control Panel	A1689

REVISIONS			
SYM	DESCRIPTION	DATE	BY
A	REVISED FILM SPOOL HOLDERS & PRESS. CHAMBER AS PER DWG. F145-A		

STATINTL





SCHEMATIC=FILM DRIVE SYSTEM

I.N. 462

FIG. 2

B931-A

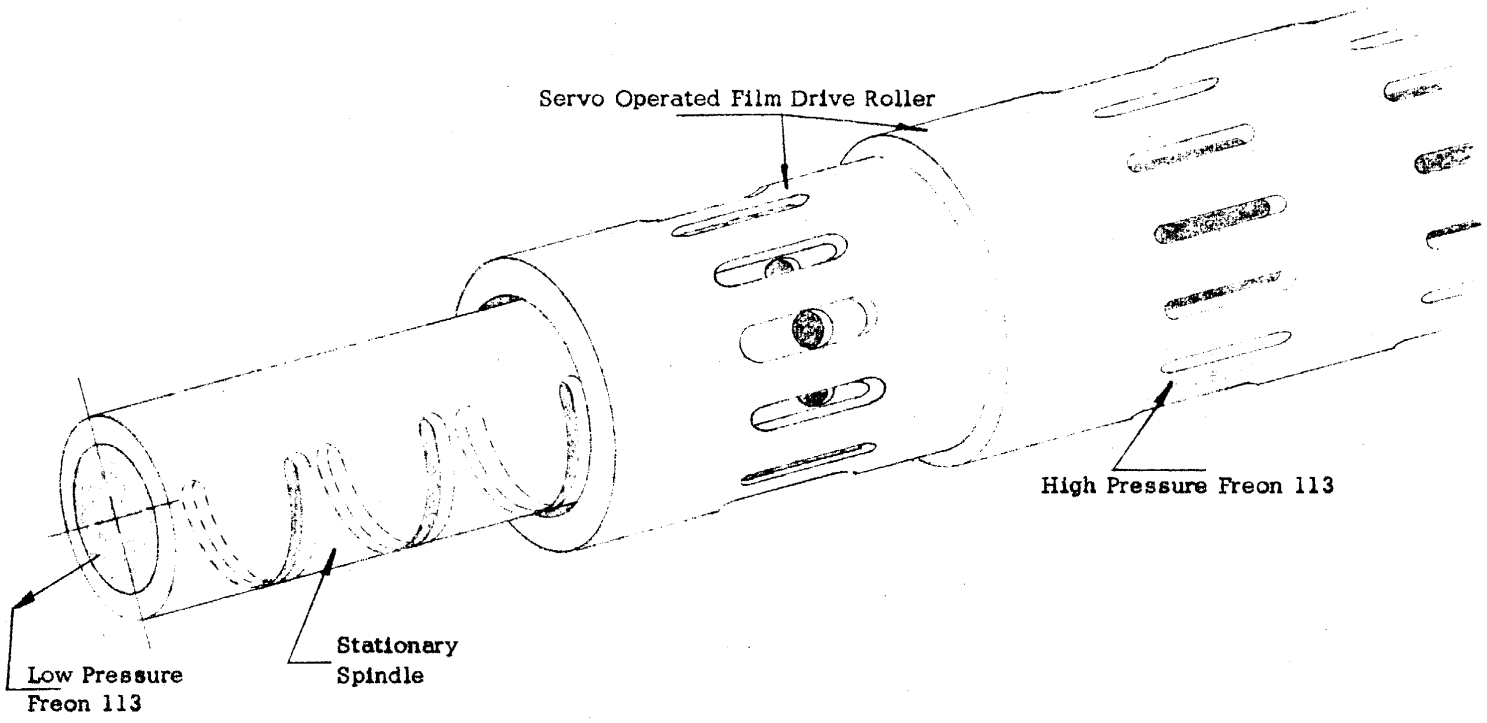


FIGURE 3

DIFFERENTIAL PRESSURE CAPSTAN

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A1641

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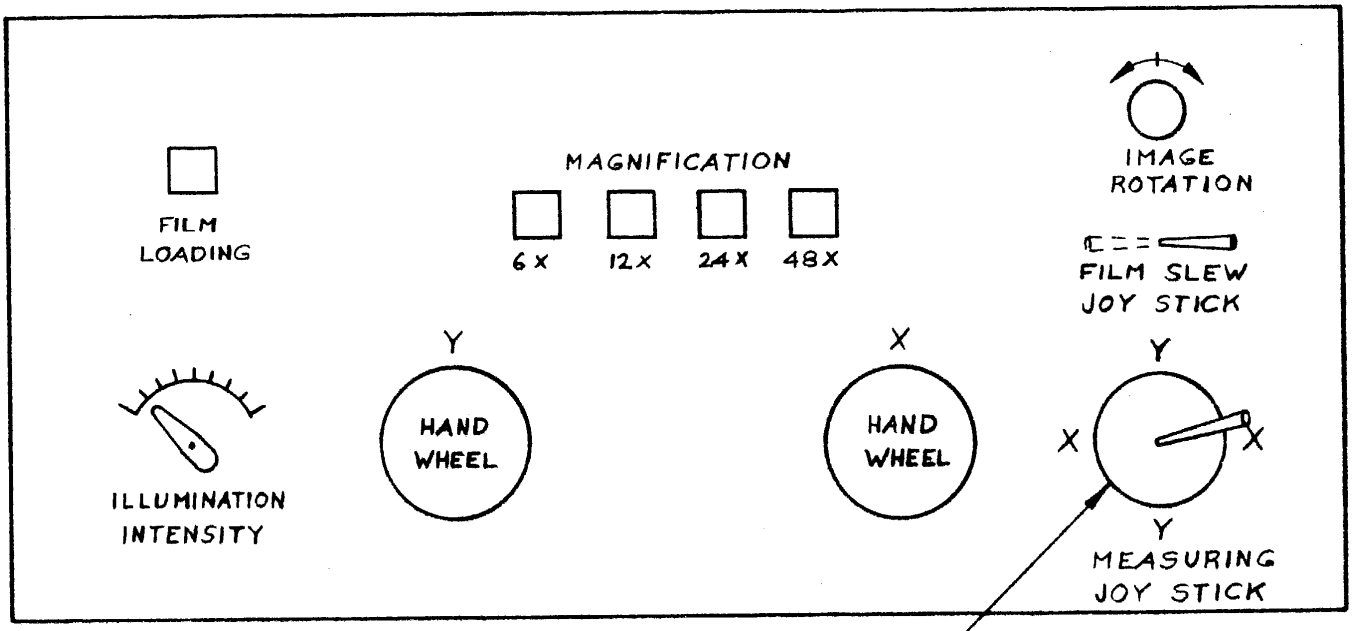

CONTROL PANEL

FIG. 5

A1689

DESIGN REQUIREMENTS FOR A VARIABLE WIDTH FILM READER

Due to the great diversity of photographic formats available and the unique problems of each, it is no longer feasible to design a film reader for each format or use the conventional moving cross wire measuring techniques. Therefore, the following design characteristics have been established for a multiple format film reader. These specifications are not absolute requirements that must be held to, but only objectives which we feel are within the state of the art. Also attached for information purposes only is a general description of the readout to be used with the reader but is being contracted for separately. A delivery schedule of approximately nine months is desired for a working model with production models following in an additional six months. Cost estimates are required for the production of the first model and for production runs of 10 each. Any interested parties are requested to submit proposals by 18 February 1963.

METHOD OF MEASUREMENT

1. The single frame area over which measurements are to be accomplished may vary from 70mm to 9½" wide with lengths in excess of 30".

2. Measurement along the length of the film is to be accomplished by metering the film movement through the film gate. Measurement across the width of the film is to be accomplished by measuring the movement or displacement of the film gate, including the film transport system, with respect to the optical axis.

3. Minimum acceptable accuracy to be ± 25 microns over an area 70mm square, and ± 1mm over an area of 9½" x 30". Design objective is to have a least count of 10 microns.

4. The digital accumulator and associated data output devices to be designated at a later date by the contracting agency and for the purpose of the proposal are not to be included in the quoted price.

5. Space is to be provided on the control panel for a visual display unit consisting of a sign and 6 digits per axis, two counter reset buttons, a numerical preset rotary switch for each decade, two preset switches, two direction of count toggle switches, twenty-one push type illuminated switches similar to the flat fact micro switches, and ten rotary twelve position switches. The maximum depth of any item does not exceed six inches.

VIEWING SYSTEM

1. Film viewing to be accomplished by a rear projection screen of 30" x 30" approx. dimensions. The screen material to be specified by the contracting office at a later date. The viewing screen shall be either vertical or tilted slightly forward.

2. Four projected magnifications of 6X, 12X, 24X and 48X ± 5% are to be provided, although the 48X lens may be retrofitted at a later date if necessary.

A zoom lens covering the same magnification range will be acceptable provided it meets the other requirements.

3. Image resolution on the screen to be a minimum of 10 lines per mm on axis at all magnifications. However, 5 lines per mm wil be acceptable at 48X as an interim measure until a better lens system can be developed. At no point on the 30" x 30" screen will the resolution be less than 75% of the above values. Resolution acceptance test to be performed at final destination with a 100 to 1 contrast resolution target manufactured by the [redacted] STATINTL

4. Measuring reference lines to be either fixed wires mounted to the focal plane of the screen, lines etched to the focal plane of the screen, or projected if this method does not affect other specifications such as screen brightness. The thickness of the reference lines to be approximately .0025.

5. The screen brightness from the position of the observer will have a minimum acceptable luminance of 10 ft-lamberts with a design objective of 100 ft-lamberts at each magnification. This luminance will be measured with a neutral density of 1.0 density filling the film plane. The screen will be evenly illuminated and at no point will the illumination deviate by more than 10%. It is required that the light intensity be variable.

6. Image rotation will be required. The minimum requirement is $\pm$ 90°, however complete 360° rotation is desirable. It is understood that the image rotation is to be used for orientation purposes only and shall not be used during the measurement process.

7. A minimum number of mirrors are to be used for folding purposes. The suggested layout allows for one fold, consequently one first surface mirror, the coated surface of which is to be downward facing to minimize collection of dust. However, if rotation of the platen/measuring engine mechanism compromises the accuracy or efficiency of the measuring engine, it will be abandoned in favor of an optical rotation system, i.e., "K" mirror or prism. The "K" mirror system presently appears less desirable.

FILM TRANSPORT

1. Film transport to accommodate various widths of roll film ranging from 1000 foot rolls of 70mm to 500 foot rolls of 9½" material of standard film thickness. However, the transport should be so designed to permit use of thin base material. A wide variety of film spools may be used but shall generally conform to Air Force specs.

a. Film cutting tolerances (slit widths) in the preparation of raw stock as furnished by the [redacted]s as follows: STATINTL

For aerial films, the widths and tolerances are in accordance with American Standard PH 1.10, 1952 and Military Specification MIL-F-32B, June 3, 1958. These are as follows:

Nominal Widths	Width Aims (In.)	Tolerances (In.)
70 mm	2.754	+0.002
5 inch	4.960	±0.010
7 inch	6.991	±0.010 - 0.005
9½ inch	9.460	+0.010 - 0.005

Two sizes are not covered by American Standard nor the Military Specification. Our current size and tolerances are as follows:

Nominal Widths	Width Aims (In.)	Tolerances (In.)
6.6 inch	6.600	+0.010 - 0.005
8.0 inch	7.960	+0.010 - 0.005

Thirty-five millimeter material is always slit to motion picture standards and in accordance with American Standard PH 22.93 and others. This dimension and tolerance is as follows:

Nominal Width	Width Aim (In.)	Tolerance (In.)
35mm	1.377	± 0.001

2. Design of the transport shall insure safe handling of film, both standard and thin base, at all speeds, i.e., no stretching, tearing, frilling edges, scratching, etc.

3. Three film drive speed ranges are to be provided.

a. High speed rapid advance/rewind. The maximum speed to be dictated by safe film handling practices.

b. Scan speed to provide suitable viewing speed at all magnifications. Film speed to be variable within any given range and smooth at all speeds. The speed range shall vary from just barely moving on the screen at 48X to the fastest at which an operator can adequately watch it at 6X. The range of speed may be operated in increments consistant with the magnification.

4. Pressure platen cannot be accommodated due to flow film measuring method.

5. Temperature of film within film gate not to exceed 20° F. above ambient of 75° F. with an average density film of 1.5. (Silver halide emlusion)

SECRET
(When Filled In)

TECHNICAL BACKGROUND PROCUREMENT INFORMATION

I. Contractor
A. Name and address: [redacted] 25X1A

[redacted] 25X1A

B. Evaluation of previous performance: Excellent engineering design capability. Management difficulties encountered on previous contract but adequate steps have been taken to correct this area.

II. Brief description of this procurement: Design and fabrication of a prototype film reader. Optical and lighting design to be coordinated with the [redacted] 25X1A

[redacted] Estimated total amt. [redacted] 25X1A

A. Deliverable items: 1 prototype film reader as outlined in their technical proposal. Operations and maintenance manuals and recommended spare parts list.

B. Is this procurement for other than a standard, "off the shelf" or slightly modified commercial item? Yes If "yes", is it anticipated that any more of this unit will be procured? Yes If so, a complete set of directly reproducible manufacturing drawings and specifications would normallybe included in this procurement. Comments: Design requirements for a variable width film reader to be incorporated as part of the contract. Complete design drawing, specifications, and technical report desired. Detailed PERT chart required. Operation manual, maintenance manual, and spare parts listing required.

C. Will contract cover a period of more than 90 days? Yes
If "yes", are progress reports desired? Yes If so, indicate frequency, content and number of copies desired: Monthly progress reports indicating technical progress made, technical concepts ruled out, PERT chart position, and percentage of authorized funds expended. Progress photography as requested by the technical monitor.

D. Is any Government-owned property to be provided to the contractor?

Yes If so, list and indicate its availability (where, when, etc.) Digital accumulator to be provided for incorporating in reader. To be

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provided at approximately the fourth month of work.

E. Is any special tooling involved? No

[redacted] 25X1A

5. Other security information

III. Reasons for selection of this source. If other sources were considered, indicate results. If no other sources were considered, list the reasons why this firm is considered to be uniquely qualified to perform this work. 25X1A

Proposals were solicited from 4 organizations felt to have the capability 25X1A
to produce the required hardware. Two were completely unacceptable and the
third from [redacted] was not considered as acceptable as the [redacted] proposal. 25X1A
[redacted] was selected on the basis of their electro mechanical design capability and
willingness to work with the [redacted] on the design of the lighting 25X1A
system. The work with [redacted] is covered by another contract. 25X1A

25X1A

IV. Technical contact [redacted]
Name Telephone

In the event additional space is required, use the reverse side(s) of this form, with a reference to the item number to which the comment applies.